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THE EUGENICS REVIEW

FRANCIS GALTON,

1822—1911.

SIR FRANCIS DARWIN, F.R.S.¹

FRANCIS GALTON was born on February 16th, ninety-two years ago, and to-day we are met together to remember him—a word that seems to me more in tune with his nature than the more formal expression *commemorate*.

He disliked pomposity, but he seems to have loved little private ceremonials. For instance, when he opened the first notebook in preparation for his autobiographical *Memories*, he began page 1 with Falstaff's words : "Lord, Lord, how subject we old men are to this vice of lying." An inverted appeal to Truth which no man ever stood less in need of. And again at the foot of the very last page of his *Memories* is a drawing of *Galtonia candicans*, a little ceremony without words, a hieroglyphic glorification of the honour paid him in giving his name to this African plant.

Many persons, and even some reviewers, form their opinions of books by reading half-a-dozen passages at random. I have been more scientific in selecting the first and last pages, and from these I conclude that a simple and kindly commemoration is not out of harmony with the genius of this great and loveable man.

I should like to express my appreciation of the honour done me in asking me to give the first Galton lecture. In many ways I am a bad choice, since I have had no share in his science of eugenics, neither has my research-work been directly connected with evolution. I can only hope that in consideration of my delight in the fibre and flavour of Galton's mind, with its youth, its charm of humour, and its ever-springing originality and acuteness, I say that I hope

¹ Being the first Galton Lecture, delivered before the Eugenics Education Society, Feb. 16th, 1914.

these considerations may excuse me for having undertaken an office for which I am in so many ways unfitted.

One of his most obvious characteristics was his love of method; I do not mean methodicalness, but that he took delight in knowing how to do all manner of things in the very best way. He also liked to teach his methods to others. Those who never saw him, or even read his books, will exclaim "What a bore he must have been." You might as well call the lightening a bore for explaining that it was going to thunder, or complain of the match for boring the gunpowder as to the proper way of exploding. With Galton's explanations there was a flash of clear words, a delightful smile or gesture which seemed to say: "That's all—don't let me take up your time." Nobody was ever more decidedly the very antithesis of a bore than Francis Galton.

He first appeared on the literary and scientific stage as a traveller, geographer, and author of a book on South Africa (1853), and it was the experience there gained that enabled him to write two years later, in 1855, that wonderful book "The Art of Travel." There he teaches such vitally important things as how to find water, how to train oxen as pack animals, to pitch a tent, to build a fire, to cook, and a thousand other secrets.

He liked, of course, to be useful to weary and thirsty travellers, but he was as much, or more impelled by the love of method for its own sake. He was in fact an artist in method. The same thing is shown in a letter he wrote to "Nature" near the end of his life explaining how to cut a round cake on scientific principles so that it shall not become stale. This again was not so much a philanthropic desire that his fellow men should not have dry cake, as delight in method.

When I re-read "The Art of Travel" quite recently, I could not find his method of preventing a donkey braying. My recollection is that, observing a braying donkey with tail erect, he argued if the tail were forcibly kept down, as by tying a stone to it, that braying would not occur. I certainly believe myself to have read or heard that this most Galtonian plan succeeded. If anyone can tell me where to look for it I shall be grateful.

Later in life he tried to make his unique knowledge of use to his country. He writes¹ :—

“ The outbreak of the Crimean War showed the helplessness of our soldiers in the most elementary matters of camp-life. Believing that something could be done by myself towards removing this extraordinary and culpable ignorance, I offered to give lectures on the subject, gratuitously, at the then newly-founded camp at Aldershot.”

He received no answer from the War Office, but a personal application to Lord Palmerston led to his being installed. He speaks of a few officers attending his course, and adds that the “ rude teachings of the Crimean War soon superseded ” his own. The chief interest of the episode is the evidence it gives of great and elaborate pains spent in the teaching of methods.

I must here be allowed to turn back to an earlier period of his life in relation to what I have been speaking of. In illustrating the different dispositions of his sisters, both of whom were dear to him, Galton writes² :—

“ My eldest sister was just, my youngest merciful. When my bread was buttered for me as a child, the former picked out the butter that filled the big holes, the latter did not. Consequently I respected the former, and loved the latter.”

Have we not here an early appreciation of method or must we merely class the memory with the scene in “ Great Expectations,” where the terrifying elder sister, Mrs. Joe, prepares bread and butter for her husband and for Pip (her little brother) in an eminently just and disagreeable manner. May I be allowed to add that a love of butter in the big holes is not hereditary in my branch of the family; I should have loved the sister who picked it out.

At a later stage in his boyhood, Galton transferred his study of method from his sisters to his schoolmasters. He describes what he suffered from the absurd limitations, which still exist, in the education of English boys, and “ chafed ” at the teaching he received. “ Grammar,” he says, “ and the dry rudiments of Latin and Greek were abhorrent to me, for there

¹ Memories, p. 163.

² Memories, p. 14.

seemed so little sense in them."¹ He suffered in fact like his cousin, Charles Darwin, who groaned over the classics at Shrewsbury School, and forgot what he learned, even to some of the Greek letters, by the time he was nineteen.

In 1838, when Galton was sixteen years of age, he became an indoor pupil at the Birmingham General Hospital. Here the education was practical enough to suit even his scientific mind, but to this coddled generation it seems a rough introduction to medicine. He had to prepare tinctures, extracts, decoctions, and learned to make pills by hand—a slow enough process. In later life, when he saw a pill-making machine at work, it must have been his boyish memories which inspired the characteristic calculation that if a grandmotherly Government possessed forty-five of these engines, it could supply each inhabitant of the British Isles with one pill per diem.² But this is a digression.

It was in the surgery that he had most experience; he and the other indoor pupils were called up at all hours to dress burns, to patch broken heads, and reduce dislocations, with, as it seems, very little instruction. It was doubtless a fine bit of education in self-reliance, and he must have learned much that was of use in South African travels. Whether as a student of method he approved of his rough and ready education is not quite clear. His genius for experiment, or rather that priceless capacity for extracting unexpected conclusions from experience, comes out in his account of a case in the Birmingham Hospital.³ An injured drayman was brought in dead drunk, and underwent amputation of the legs without any sign of feeling pain. This set Galton wondering whether patients might not with advantage be made drunk before operations—a query which was soon happily answered by the discovery of anæsthetics.

Another most characteristic event was his desire to learn the properties of all the drugs in the pharmacopœia by personal experience. He determined to dose himself alphabetically, but

¹ Memories, p. 20.

² Memories, p. 28.

³ Memories, p. 35.

got no further than C., for the effects of croton oil put a stop to his thirst for first-hand knowledge.

We must pass over his time at King's College, London, where, as he sat at lecture, he could see the "sails of the lighters moving in sunshine on the Thames,"¹ a vision which stirred his blood with a longing for adventure, and which, as he characteristically noticed, always occurred when the weather-cock on the Horse Guards showed that the south-west wind was blowing.

We must, in like manner, skip his undergraduate days at Trinity, Cambridge. We thus arrive by a devious route at the period when he returned a traveller and geographer of recognized merit, and began the work with which he was practically connected for many years, as a member of the Meteorological Committee.² His best-known contribution in the science was in a paper read before the Royal Society in 1862, where his discovery of the anticyclone was first described; but he also had a good deal to do with the printing and publishing of the now familiar weather charts. Meteorology takes us from 1861 to 1863 that is nearly to 1865, when his first paper on Heredity appeared, which was at the same time his first paper on hereditary genius. This line of research was to form his chief claim to celebrity, and must be separately treated.

Meanwhile I wish to say something of his love of experiment which is a branch of his devotion to method. We only know of the more entertaining of his inquiries from his delightful book of *Memories*, but I cannot avoid the fear that he has left out many experiments even stranger than those he published. My father had a special affection for what in his own case he called "Fool's experiments." These are what, I am afraid, Galton may have omitted. Still there are records of some delightful lines of work.³ He is probably the only man who ever attempted to solve by experiment the problem of free will and determinism. He limited his inquiry to the question whether there exists in human affairs such a thing as an

¹ *Memories*, p. 48.

² *Memories*, p. 233.

³ *Memories*, p. 295.

"uncaused and creative action." The experiment, or rather self-observation was carried on (1879) for six weeks, almost continuously, and "off and on for many subsequent months." He found that with practice he could nearly always trace the "straightforward causation" of a given action, which at first seemed to have been performed "through a creative act, or by inspiration."¹

Then there was his attempt to experience the feelings of the insane. "The method tried was to invest everything I met, whether human, animal, or inanimate, with the imaginary attributes of a spy."² The trial was only too successful; by the time he had walked 1½ miles to the cabstand at the east end of the Green Park "every horse in the stand seemed watching" him, "either with pricked ears, or disguising its espionage."³ He adds that hours passed before this uncanny sensation wore off.

On another occasion he managed to create in his mind the feelings of a savage for his idol, the idol in his own case being a picture of Mr. Punch.

These experiments seem to me very characteristic of the man in their originality, their humour, and their unexpected measure of success, for personally, I should have prophesied failure in all. They have a special bearing on Galton's belief that a quasi-religious enthusiasm for eugenics may be built up. I have sometimes wondered that he should believe this great change so feasible, but I understood how he came to think so when I read of his strange power of impressing beliefs on himself, with such force as to leave a trail of discomfort in the mind after the make-believe had ceased.

These and similar trials were, I think, made in relation to his desire to weigh and measure human faculty in a broad sense. I remember his telling me of his experiments on the mind of the British cabman. His method was to use alternately two different forms of the address to which he wished to go. Thus on Monday he would tell the man to drive him home to 42,

¹ Memories, p. 295

² Memories, p. 276.

³ Memories. p. 276.

Rutländ Gate, on Tuesday he would say "Rutland Gate, 42," and so on. My recollection is that the cabmen understood quickest the familiar formula in which the number precedes the name of the street.

There was also a characteristic experiment or inquiry into the intensity of boredom in a lecture audience, by counting the number of fidgets per man per minute. In this case to avoid the open use of a watch, he estimated time by the number of his own breaths, "of which there are fifteen in a minute." I hope my brother will forgive my adding that he found the Royal Geographical Society meetings good hunting-ground for fidgets, for as Francis Galton remarks: "Even there, dull memoirs are occasionally read."¹

Lastly, I must mention his plan of marking, by means of a hidden apparatus, the beauty of the women he met in the streets of different towns. He classified them as pretty, ugly and indifferent, and I am glad that in his beauty map, London came out top; Aberdeen, I regret to say was at the bottom.

But in speaking of measurement of human faculty we have got quite out of any reasonably chronological sequence, for the book bearing that title appeared in 1883. But the estimation of human characteristics especially in relation to heredity was in Galton's mind several years earlier, and in 1865 he wrote the two papers in *Macmillan's Magazine* which contain the germs of his later work on heredity and eugenics. It is unfortunate that the research on heredity, together with its practical application to human welfare in the new science of eugenics, should not have more space given to it in his autobiographical *Memories*; there are but thirty-seven pages—or 11 per cent of the whole book. The specific importance of the subjects here dealt with is so great that these thirty-seven pages outweigh, for this Society, all the rest of the book. We should like to have had a fuller account by the author of this remarkable work of 1865. He does, however, tell us—and it is a very striking statement—that the two articles "expressed then, as clearly as I can do now, the leading principles of Eugenics."² The chief point in

¹ *Memories*, p. 278

² *Memories*, p. 312.

which he came to differ from the Macmillan articles was that he was then "too much disposed to think of marriage under some regulation, and not enough of the effects of self-interest and of social and religious sentiment."¹

I imagine that the pendulum has now swung the other way, and that one of the most hopeful and practical schemes is the prevention of marriage among habitual criminals and the feeble-minded.

Galton attributes his work in heredity in some measure to the publication of the *Origin of Species* which, he says, "made a marked epoch" in his "mental development as it did in that of human thought generally."²

That Galton personally felt no difficulty in assimilating the new doctrine, he characteristically ascribes to a "bent of mind that both its illustrious author" and himself had "inherited from" their "common grandfather, Dr. Erasmus Darwin."³ But in our day the name of Galton is intimately connected in our minds with the science of heredity, and we forget that he, like lesser men, was as a mine fired by the *Origin*.

He was "encouraged," he says, "by the new views to pursue many inquiries which had long interested" him "and which clustered round the central topics of heredity." This was the charge with which the mine had been loaded,—the *Origin* was the fuse.

When that book was published in 1859, nearly everyone here to-night must have been too young to know anything of the great change in the colour of human thought which was ushered in. There are more who may remember how twelve years later when the *Descent of Man* came out, there was still plenty of clerical and other forms of foolish bitterness. But a man needs to have been in the full swing of mental activity in 1859 to perceive the greatness of the change due to the *Origin of Species*.

His two papers in *Macmillan's Magazine*, 1865, pp. 157 and 318, seem to me very remarkable and, as I have said, they

¹ Memories, p. 310.

² Memories, p. 287.

³ Memories, p. 288.

are passed over too lightly by the author in his *Memories* (p. 310). They contain a statistical proof of the inheritance of intellectual and moral qualities.¹ And those who would allow the truth of this statement must further agree that it is the first statistical demonstration of this important fact that the world has seen. And he insists that the whole spiritual nature of man is heritable, so that in his opinion there are no traces of that new element "specially fashioned in Heaven"² which (he says) is commonly believed to be given to a baby at its birth.

The paper contains a very interesting discussion on the development of social virtues by natural selection. He gives, too, a characteristic explanation of that human attribute commonly known as original sin, the quality in fact which makes men yield to base desires against and in spite of their sense of what is right.

He says³ that here "the development of our nature under Darwin's law of natural selection has not yet overtaken the development of our religious civilisation." It may be more briefly described as the conflict between the individual desires with the tribal instincts. It must be remembered that for all this discussion Galton had no *Descent of Man* to guide him.

I shall come back later to his clear and courageous statement of eugenics in 1865, meanwhile I must speak of heredity, a word, by the way, introduced by Galton and for which he seems to have been taken to task.

With regard to the machinery of reproduction the essay is remarkable for containing what is practically identical with Weismann's continuity of the germ-cell, and Galton's priority is acknowledged by that author. But in science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs. Not the man who finds a grain of new and precious quality but to him who sows it, reaps it, grinds it and feeds the world on it. This is true of this very *Macmillan's Magazine* article. Who would know of these admirable views on Hereditary Genius and Eugenics, if this were Galton's only

¹ In *Memories*, p. 310, he criticises the statistical methods of this work.

² *Memories*, p. 316.

³ *Macmillan's Magazine*, p. 327.

utterance? This is the grain which has increased and multiplied: and it is to-day familiar nutriment and is now assiduously cultivated by the Eugenics Education Society. But if *Natural Inheritance*, and *Hereditary Genius* had not been written; if the papers on eugenics had not appeared, and especially if he had not convinced the world of his seriousness by creating a eugenic foundation at University College, where his friend Professor Karl Pearson carries on the Galtonian traditions—why then the paper in *Macmillan* would have counted for very little. But it was not quite unnoticed. By my father it is referred to in the *Variation of Animals and Plants under Domestication*. Galton was encouraged and reassured by Darwin's appreciation of his work: his words in *Hereditary Genius*¹ are “I feel assured that, inasmuch as what I then wrote was sufficient to earn the acceptance of Mr. Darwin . . . the increased amount of evidence submitted in the present volume is not likely to be gainsaid.” He was characteristically generous in owning his debt to the author of the *Origin of Species* and characteristically modest in the value he ascribed to my father's words of encouragement. The book on *Hereditary Genius* strikes me as most impressive. It seems as though the man whom the world had agreed to honour as an admirable and indeed a brilliant worker in geography and meteorology had suddenly grown big. He had shown himself to have the power of sustaining a weighty argument in strong and temperate phrase, speaking as a judge rather than an advocate, and to have definitely taken rank with Darwin, Lyell, Hooker and Huxley, men whose pens have dinted the world, leaving their ineffaceable mark on the road trodden by the march of science.

When I was working at the *Life and Letters of Charles Darwin*, I naturally asked Mr. Galton for leave to publish the letters he had received from my father. But he would not agree. Mr. Darwin, he said, had spoken far too kindly of his work and he preferred to keep the praise to himself. But later when he wrote his *Memories*,² he fortunately realised that it is

¹ *Hereditary Genius*, p. 2.

² He had already allowed Professor Seward and myself to publish them in *More Letters of Charles Darwin*.

wiser to think of the value to the world of such documents, than of private likes or dislikes. The letter my father wrote about *Hereditary Genius* which Galton says "made him most happy" begins :—

"I have only read about 50 pages of your book . . . , but I must exhale myself, else something will go wrong in my inside, I do not think I ever in all my life read anything more interesting and original."¹

In reading this great book it is, I think, impossible to doubt about the strength of the work. The quiet relentless way in which his territory is pegged out, and the clear wisdom with which the very terms of the new science are defined are equally impressive. And for lighter enjoyment his illustrations are to be recommended. He has to settle precisely what he means by a man being *eminent* or *illustrious* before he can begin to ask are these qualities hereditary. An eminent man is one in four thousand, and to make clear what this implies, he writes, "On the most brilliant of starlight nights there are never so many as 4,000 stars visible to the naked eye at the same time; yet we feel it to be an extraordinary distinction to a star to be accounted as the brightest in the sky."² If we could imagine that each new night shows us a fresh set of stars, we might speculate as to how many nights we should watch the sky before we found one bright enough for Galton.

In the same way he tries to make us see a million, because in that number there is but one *illustrious* man. He worked it out in Bushey Park where he had gone to see the horse-chestnuts in flower, and came to the astonishing conclusion that taking one half only of the avenue and the flowers visible on the sunny side of that row, it would require 10 miles of avenue to give 1,000,000 spikes of blossom.

Later he defines *mediocrity* in a way not very flattering to those, who, like myself, live in the country. Mediocrity³ then "defines the intellectual power found in most provincial gatherings, because the attractions of a more stirring life in the metro-

¹ *Memories*, p. 290.

² *Hereditary Genius*, p. 9.

³ *Hereditary Genius*, p. 31.

polis and elsewhere are apt to draw away the abler classes of men, and the silly and imbecile do not take a part in the gatherings." On this last point, by the way, I am not convinced. The research on the heredity of mental and moral characters leads naturally to eugenics, as in the Macmillan paper of 1865. But before dealing with this I must say a few words about what, in the opinion of some, is Galton's chief claim to eminence—the study of heredity as a whole. There is no doubt that he was the first to treat thoroughly and in a strict statistical method, the steps by which one generation passes into the next. He was pre-eminently a lover of statistics, he was indeed what Goschen called himself : "A passionate statistician."

He used Gauss's Law of Error, which Quetelet had already applied to human measurements. "The primary objects," he says,¹ "of the Gaussian Law of Error were exactly opposed, in one sense, to those to which I applied them. They were to get rid of, or to provide a just allowance for errors. But these errors or deviations were the very things I wanted to preserve and to know about."

This conception of variation impressed him deeply, so that he remembered the exact spot in the grounds of Naworth Castle where it first occurred to him "that the laws of heredity² were solely concerned with deviations expressed in statistical units."

What may be called the final result of Galton's work in heredity is, I imagine, his *ancestral law*, namely that "the average contribution of each parent" to its offspring is one quarter, or in other words that half of the qualities of the child can be accounted for when we know its father and mother. In the same way the four grandparents together contribute one quarter and so on. He illustrates this by calculating how much Norman blood a man has who descends from a Baron of William the Conqueror's. Assuming that the Baron weighed 14 stone, his descendant's share in him is represented by 1/50 grain.³

¹ Memories, p. 305.

² Memories, p. 300.

³ Macmillan, p. 327.

This side of Galton's work is, in the judgment of many, his greatest claim to distinction as a master in the science of heredity. How far this is so I shall not attempt to pronounce. It is possibly still too soon to do so. Nevertheless it seems to me that Mendelism (the main facts of which are no longer in dispute) will compel the world (if it has not already done so) to look at variation in a very different way to that of Galton. The Mendelian does not and never will look at variation merely as a "deviation expressed in statistical units." Nor can he accept the ancestral law, because he has convinced himself that some ancestors contribute *nothing* in regard to certain characters.

The contrast between Galtonism and Mendelism may be illustrated by an example which if not a strict analogy has in it something illuminating, especially for those who do not know too much of the subject. Galton seems to me like a mediæval chemist while Mendel is a modern one. Galton can observe, or can follow the changes that occur when two compounds are mixed. But he knows nothing of the mechanism of what occurs. But the Mendelian is like a modern chemist who calls the chemical elements to his aid, and is able to express the result of the experiment in terms of these elements. This is an enormous advantage, and if my analogy is to be trusted it would seem as though a progressive study of heredity must necessarily be on Mendelian lines.

But it obviously does not follow that the laborious and skilful work of Galton and his school is wasted. Those who wish to have made plain to them how Biometrics may illuminate a problem which cannot as yet be solved in Mendelian fashion should read Dr. Schuster's most interesting book on eugenics. I am thinking especially of the question as to the heredity of tuberculosis and cancer. The relation between Galtonism and Mendelism is also well and temperately discussed in Mr. Lock's *Recent Progress in the Study of Variation*, 1906.

But it is time to speak of Galton as a eugenicist—on which if we look to the distant future his fame will rest. For no one can doubt that the science of eugenics must become a great and beneficent force in the evolution of man.

We must be persistent in urging its value, but we must also be patient. We should remember how young is the subject. As recently as 1901 Galton was, in his Huxley Lecture, compelled to speak of eugenics in these terms¹ :—

“ It has not hitherto been approached along the ways that recent knowledge has laid open, and it occupies in consequence a less dignified position in scientific estimation than it might. It is smiled at as most desirable in itself and possibly worthy of academic discussion, but absolutely out of the question as a practical problem.” After explaining that the object of his discourse was to “ show cause for a different opinion,” he goes on with what, in his restrained style, is strong language: “ I shall show that our knowledge is already sufficient to justify the pursuit of this perhaps the grandest of all objects.”²

At the close of the lecture he speaks out as to the difficulties and the pre-eminent value of eugenics and once more of the oppressive “ magnitude of the enquiry.”

No one who reads this lecture of Sir Francis Galton’s is likely to let eugenics go with a smile and a remark that it is not a practical problem. It is one of the functions of the Eugenics Education Society to spread the sanely scientific views here set forth by Galton, and as far as I am able to judge the Society has and is doing sound work in this direction.

In another essay,³ Galton discusses the meaning of the “ Eu ” in eugenics in a characteristic way. He imagines an attempt among the animals in the Zoological Gardens to establish a code of absolute morality. With customary love of detail, he supposes the inquiry to be undertaken by some animal such as a sparrow or a rat which is intelligent and has easy access to all the cages, and is therefore able to collect opinions. There would be strongly pronounced differences between the carnivorous animals and those which form their natural prey. There would be a general agreement as to maternal affection, though fishes and the cuckoo would laugh at it. But all would agree on *some* eugenic principles: That

¹ Essays in Eugenics, p. 1.

² Essays in Eugenics, p. 1.

³ Essays in Eugenics, p. 35.

it is better to be healthy and vigorous than sickly and weak—well-fitted for their part in life rather than the reverse, in fact good specimens of their kind whatever that kind may be.

Sir Francis Galton goes on to give a list of qualities that “nearly every one except cranks would take into account in picking out the best specimens of his class.” The list would “include health, energy, ability, manliness and courteous disposition.”¹ I wish he had thought of eugenic mothers and had translated manliness into the feminine equivalents of courage and endurance. When I first read this list it struck me at once how highly distinguished was Galton himself in all these qualities. As we dwell on the qualities one by one, they seem to call up echoes from the image we have of his character. “Ability, manliness, and courteous disposition,” how strong these were in him! I cannot help feeling that he might have added one more quality from his own treasure-house, namely, a sense of humour, which is so priceless an antiseptic to sentimentiality, and was strongly and individually present in his character.

In this same lecture,² Galton sums up the stages in the development of eugenics (I.) “It must be made familiar as an academic question.” (II.) As a practical subject worthy of serious consideration. (III.) It must be “introduced into the national conscience, like a new religion.” He recapitulates in an eloquent phrase: “It has, indeed, strong claims to become an orthodox religious tenet of the future, for Eugenics co-operates with the workings of Nature by securing that humanity shall be represented by the fittest races. What Nature does blindly, slowly, and ruthlessly, man may do providently, quickly, and kindly.”

Here we see the future of eugenics marked out for us, and the last sentence might well serve as a motto for this Society. How are we to work for the cause?

It is true that our opinions are formed by the daily papers, and our actions as a nation are determined by political parties which come and go largely by chance. But, however our

¹ Essays in Eugenics, p. 37.

² Essays in Eugenics, p. 42.

opinions originate, if they are strongly and persistently urged by a large majority of Englishmen, great changes in the manner of human life may be effected. Persistence is the great thing in all reforms, it is a case of my father's favourite quotation—"It's dogged as does it." Francis Galton has been temperately persistent in a marked degree. His caution and wisdom are illustrated by the dates of his writings on eugenics and heredity, which placed in order suggest a regiment at slow march, not a bunch of heroes rushing on a breach.

Two papers in Macmillan's Magazine	1865
Hereditary Genius	1869
Fraser's Magazine	1873
Human Faculty (word Eugenics first employed)	1884
Natural Inheritance	1889
Huxley Lecture	1901
Sociological Society Papers	1905
Memories	1908

The temperateness of his march is all the more striking when we remember the fiery impatience with which in *Hereditary Genius* he spoke of the harm done by the church by ordaining that the intellectuals, the literary, and the sensitive should be celibates, and of the wholesale slaughter by the Holy Inquisition of the courageous and clear minded who dared to think for themselves.

From the first he had the support of Charles Darwin who never wavered in his admiration of Galton's purpose, though he had doubts about the practicality of reform. His hesitation in regard to eugenic method is expressed with a wise proviso as to future possibilities: "I have lately been led," he says, "to reflect a little . . . on the artificial checks, but doubt greatly whether such would be advantageous to the world at large at present, however it may be in the distant future."¹ In the first edition of the *Descent of Man*, 1874,² he distinctly gives his adherence to the eugenic idea by his assertion that man might by selection do something for the moral and physical qualities of the race. It is a great thing that this Society should have

¹ More Letters, II., p. 43 and 50.

² One Volume Edit. 1894, p. 617.

had Francis Galton for its Hon. President. It entitles us to feel assured that in following the line of action marked out for ourselves we are on the right track, and that in the difficult pioneer work of helping the English public to realise the deadly need of eugenic reform we are following in Galton's steps. We are also so fortunate as to have received the encouragement and help at the hands of some of the leaders in the science of heredity, Weismann, Yves Delage, Ray Lankester, the late Adam Sedgwick, Poulton, Bateson, Punnett, and others.

Galton says somewhere¹ that great men have long boyhoods, this was certainly true of him, though I should rather describe as *youthful* the delightful qualities that never faded out of his nature. It is, I believe, the correct thing to speak of the "golden dreams of youth," and if by this hackneyed phrase we mean a keenly imaginative outlook, a hopefulness with a certain dash about it—a generous courage such as a hero of romance is credited with—then Francis Galton had undying youth. And this makes his seriously measured progress in eugenics all the more worthy of our admiration.

In one of the Macmillan articles (p. 324) he wrote : " Many plan for that which they can never live to see. At the hour of death they are still planning."

It was thus that Francis Galton died, and as year after year we meet together on February 16th, let us think of him and his plannings with affection and respect.

¹ Macmillan's Magazine, xii., p. 326

A CONTRIBUTION TO THE BIOLOGY OF SEX.

By GEOFFREY SMITH.

BEFORE addressing this Society on a subject which at present has very little practical bearing on racial improvement, I must urge as preface that speculations which may be legitimate and useful in the domain of theory are apt to be interpreted mischievously if transported prematurely into the arena of practical affairs in which human interests are concerned. Crude biological analogies applied to human life are not so completely out of fashion that a biologist, speaking to such a society as this, can expect to be absolved from the suspicion of preaching a practical doctrine when he is merely describing facts of economy or organisation presented by the animal kingdom. It is perfectly true that we can no longer look upon man as isolated from the rest of creation, and independent of the laws which govern life in all its manifestations, but the study of nature, though it may throw much light on the possibility of what man can attempt, may be coldly silent on the question of what he ought to do.

There are several problems connected with sex, the solution of which would have an important influence on human affairs, but apart from their solution which, indeed, may seem very remote, the mind craves for some guidance as to the attitude in which they are to be faced. Of these problems I propose to say something about three. First, there is the determination of sex; what are the factors which determine the sex of the offspring, and what likelihood is there that these factors will be ever controllable at will? It will be admitted that this question might assume a practical aspect of some importance.

Second, what is the adaptive meaning of sex in general, and how far is the sexual constitution of the human race better or worse adapted for life under civilised conditions as compared with animals living in a state of nature? This question is very largely theoretical, but I suppose that our views on the subject might influence our attitude on such practical affairs as sexual hygiene.

Thirdly, what are the conditions of development and inheritance of the so-called secondary sexual characters, *i.e.*, all those psychical and physical characters in which the sexes differ from one another apart from the primary organisation immediately connected with reproduction? This again is a highly theoretical subject, and can chiefly influence our attitude to affairs by tingeing our views or prejudices with the mellowing light of philosophy.

Recent discoveries concerning the determination of sex have had the effect of convincing most biologists that the artificial production of male or female at will is further off than ever, if not permanently impossible. Professor Correns¹ concludes his excellent summary of recent work with the prophecy that before long we may be able to prove "that the determination of sex in human beings, according to our wishes, is as practically impossible as the squaring of the circle or perpetual motion is theoretically."

This attitude, which within the last ten years has been steadily gaining ground and represents a complete change from that commonly adopted in past times, is due to a weighty accumulation of cytological evidence, tending to prove that sex is irrevocably determined at fertilization by the mating of the gametes which combine in fertilization to form the zygote.²

Before these discoveries it was very commonly assumed that the zygote was sexually indifferent during a considerable period of its development, and that various environmental conditions might play a part in biasing the development towards the male or female state; it is now known that in a very large number of animals the spermatozoa or male sexual cells are of two kinds produced in equal numbers, and differing in the number or constitution of their chromosomes, and that one kind in fertilization, *viz.*, the kind which contains the X chromosome, gives rise to a female zygote, and the other, which lacks the X chromosome, gives rise to a male. Since these two kinds of spermatozoa are produced in equal numbers and since fertiliza-

¹ Correns, C. Die Vererbung und Bestimmung des Geschlechts. 84, Versammlung deutscher Naturforscher und Ärzte in Münster. Sept. 12th, 1912.

² Caulley, M. Les Problèmes de la Sexualité Bibliothèque de Philosophie Scientifique. (Useful summary of recent work)

tion takes place between the gametes apparently at random, the chances are that the sexes are produced in equal numbers, and certainly no alteration of the environment acting on the zygote, subsequently to fertilization, can affect its sexual constitution.

We may grant that the evidence in favour of this view is overwhelmingly strong; but having granted that, we may bear in mind certain facts which show that the production of the sexes in equal proportions may be materially modified by conditions which may not ultimately prove to be completely beyond artificial control.

It is known that in certain animals, such as the Phylloxera¹ and the Bee², that the egg when fertilized invariably gives rise to a female, and this is due to the fact that the male-determining spermatozoa are either abortive and incapable of effecting fertilization or else by a modification of the maturation processes they are never even produced, so that fertilization is always effected by a spermatozoon carrying the female determinant. Now if it were possible in an animal which normally produces spermatozoa of the two kinds in equal proportions to eliminate at will wholly or in part one or other kind of spermatozoa, it would be possible to produce male or female zygotes at will.

We have evidence in birds that certain conditions do actually bring this result to pass in a determinate way; thus Guyer, Mrs. Haig Thomas and myself³ have shown that when various kinds of birds, such as distinct species of pheasants, pigeons, and probably finches, are hybridised, the normal proportions of the sexes are completely upset, and a very great preponderance of males is produced; and it appears that this result is due to the female zygotes either not being formed in their full proportions or else to their dying at a very early stage of embryonic development indeed.

The fact that this result can be brought about by hybridisation shows clearly that the male- and female-forming gametes, or else the male and female zygotes at a very early stage of their

¹ Morgan, T. H. Sex-determination in Phylloxera and Aphids. *Journal of Exp. Zool.* Vol. VII.

² Nachtsheim, H. Über die Geschlechts Bestimmung bei der Honigbiene. *Archiv f. Zeillforschung* Bd. II. Hft. 2. 1913.

³ Smith, G. and Haig Thomas, R. Sterile and Hybrid Pheasants. *Journal of Genetics*. Vol. 3 No. 1.

development, possess a different physiological constitution, exhibiting a different degree of sensitiveness and viability under varying circumstances, and if this is so, it appears to be not outside the bounds of possibility to find some artificial means of increasing or decreasing the proportions in which effective gametes of one or other kind shall be produced and of thus controlling the proportions in which the sexes are produced. While admitting therefore that the artificial control of sex determination is as remote now as ever, I do not at all agree with Professor Correns that recent discoveries have proved the physical impossibility of such a control.

It is, perhaps, of interest to note that if in man, as seems to be the case, sex is determined by the nature of the male gamete which effects fertilization, the means of artificially controlling sex must be sought not in accordance with the old usage of subjecting the female during pregnancy to various conditions of nutrition, etc., but in so affecting the male as to alter the proportion in which he produces the two kinds of spermatozoa.

I turn to the second of the three problems proposed for discussion, what is the adaptive meaning of sex in general, and how far is the sexual constitution of the human race better or worse adapted for life under civilised conditions as compared with animals living in a state of nature? In regard to the first part of this question, what is the adaptive meaning of sex in general, biology is not so much silent as dubious and confused. It is a strange thing that despite all the minute knowledge we have of sexual phenomena in plants and animals, despite the fact that all these varied phenomena can be reduced in terms of the cell theory to the simple proposition that the fact underlying them all is the fusion of two nuclei, yet we are really in the dark as to what this nuclear fusion really portends, what advantage it confers or what function it subserves. One thing seems certain, that in its origin, and, indeed, at the present time among the lower forms of life, it has nothing to do with increasing the power of reproduction and multiplication. Consider the bacteria, how they grow and increase; consider protozoa like Euglena or Amœba proteus; in none of these forms

is a sexual process hinted at, yet they might be taken as patterns of rapid reproduction. Indeed, a consideration of sex and reproduction in the lower forms of animals and plants leads to the conclusion that the two processes so far from being connected are directly antagonistic, and that active propagation so far from being favoured is actually checked by the appearance of the sexual forms. The vulgar error that sex and reproduction are necessarily bound up with one another as cause and effect is shattered by a comprehensive survey of the conditions occurring in the animal and vegetable world as a whole; so that we must look for some other explanation of the advantage which is gained by that fusion of nuclei which it is admitted is the essential fact in sex.

An examination of the various theories, none of them completely or even considerably satisfactory, which have been propounded on this head, would lead me too far afield, and interesting as the topic may be, it is after all one that is very remote in its bearing on the upper scales of creation, because whatever may be true of sex in its origin and in the lower forms of life, it is an indisputable fact that sex and reproduction in the mammalia are so indissolubly connected that sexual reproduction is the only form of reproduction that occurs, or, as far as we know, can possibly occur. It may be of interest to observe that in the last few years parthenogenetic development has been artificially produced in a vertebrate, the frog¹; but it is only with great difficulty that the tadpoles so produced can be reared through their metamorphosis, and it must be remembered that in no case, even in the invertebrates, has it been possible to obtain by artificial parthenogenesis normal adult animals capable of reproduction.

We may pass from the general meaning of sex to the more special question of the respects in which the sexual constitution of man is better or worse adapted to the conditions of civilised life than is the case with organisms living in a natural state.

It is often the custom to regard organisms in a natural state as very perfectly adjusted to their conditions of life, and a lamentable comparison is drawn between their happy state and

¹ Bataillon, E. Archiv de Zool. Exper. 1911.

that of human beings on whom civilization appears to have conferred a not unmixed blessing. I suppose that this was the attitude of many of the eighteenth century philosophers, such as Rousseau, and though Darwin clearly insists on the imperfection of adaptation found in organisms, yet the immense emphasis which the Darwinian teaching laid on adaptation has tended to the conviction that every organ and function in an animal or plant living under natural conditions is well adapted to some beneficial purpose, and that where we fail to perceive this it is due to our ignorance and not to a fault in nature.

Metchnikoff¹ in his book, "The Nature of Man," has made an interesting contribution to this subject and has pointed out that in all living things, including man, the process of change and evolution has resulted in producing what he calls disharmonies as well as harmonies in their constitution, and though he is at especial pains to bring into prominence the disharmonies in man's constitution, to which he attributes all the ills that human flesh and spirit are heir to, yet he admits that disharmonies are not confined to such civilised man but are exhibited by natural species as the necessary accompaniment of the evolutionary process.

In the matter of the sexual economy of animals and plants we meet with many marvellous and perfect adaptations for securing the propagation of the species and for ensuring cross-fertilization : of the existence of disharmonies, which in the case of man we must admit to occur, there has hitherto been little or no evidence in natural species, but a case to which I have paid a good deal of attention has suggested to me that the radical changes in sexual economy which many organisms have undergone as the result of alterations in their mode of life have ended in endowing some of them with very anomalous and disharmonious characteristics. Specialisation and success in regard to one set of conditions may bring an organism into such a position that many of its properties, which were suited to a less specialised mode of life, become useless and even harmful, and yet are not eliminated owing to the almost perfect adaptation of the organism in other directions, and this appears to be as true of natural species as of civilised man.

¹ Metchnikoff, E. *The Nature of Man*

There are certain parasitic crustacea, related to the barnacles and known as Rhizocephala,¹ which, instead of fixing like the barnacles on rocks and other inanimate objects, have taken to living parasitically on crabs of various kinds. The parasite gains an entrance into the crab while it is still a minute larva, by penetrating the base of a hair on the crab's body; and having gained an entrance it proceeds to grow into a system of branching roots which ramify throughout the crab's body following the courses of the blood sinuses. A part of this system of roots becomes applied to the crab's body where the tail joins on to the thorax, and in this part which takes on a saccular form the reproductive organs, both ovaries and testes, are developed, and thrust to the exterior in an investing sack. This sack attached underneath the crab's tail grows to a large size as the reproductive organs within it grow to maturity, being nourished all the time from the root system which remains inside the crab's body (Fig. 1). Now each parasitic sack being carried

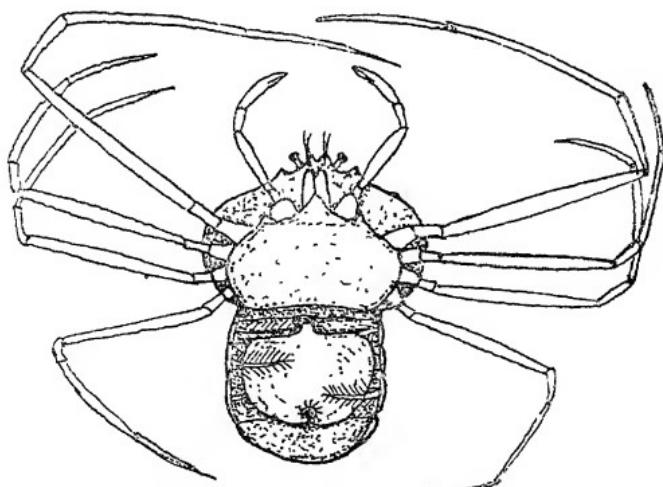
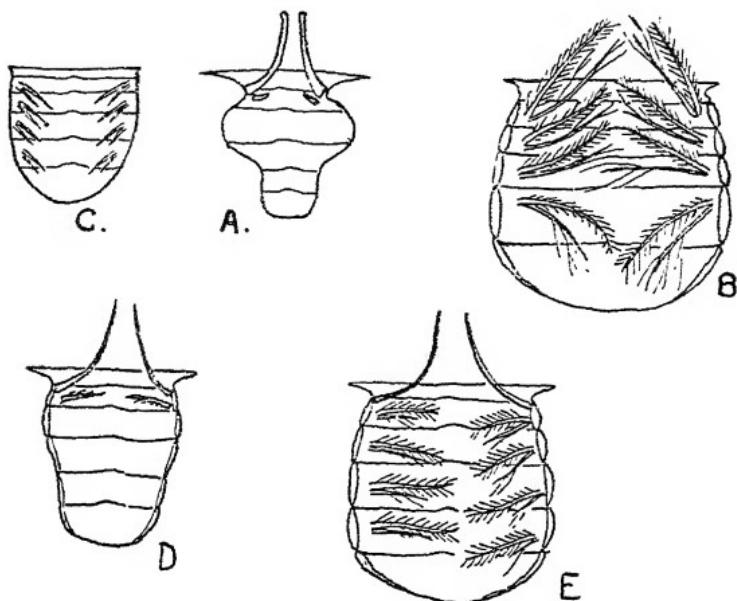


Fig. 1.—Female Spider-Crab (*Inachus*) from under surface, showing *Sacculina* attached to Abdomen.

¹ Smith, G. The Rhizocephala. Naples Monographs. No. 29.



EFFECT OF SACCOLINA ON INACHUS.

Fig. 2.—Abdomen of—A. normal male; B. normal female; C. young female; D. and E. infected males, from ventral surface; D. and E. show modification to female state.

about by the infected crab is entirely isolated from all other adult members of its species, so that cross-fertilization between two sacks is impossible, and as a matter of fact we find that self-fertilization invariably occurs, the spermatozoa produced in the sack fertilizing the ova produced by the same sack. Now this in itself would be nothing more remarkable than continuous self-fertilization, but the story by no means stops here. If we examine the sack some few hours or days after it has come to the exterior we almost invariably find fixed to it a number of minute larvae varying from one to about thirty, of its own species and resembling in every detail the larvae which infect the crabs. There can be no possible doubt that these represent the so-called complementary males which Darwin originally discovered in other cirripedes, the object of which is to ensure cross-fertilization in the hermaphrodite adults. But it can be clearly proved that these larvae in the parasitic Rhizocephala never develop into males, never form spermatozoa, and never therefore fertilize the hermaphrodite individuals, but

degenerate in situ, while fertilization is invariably affected by the spermatozoa of the hermaphrodite itself. This means that in every generation a considerable proportion of the larvæ produced, perhaps a half, supposing that these degenerate complementary males are produced in numbers equal to the hermaphrodites, are sacrificed to an instinct which is now useless, and are absolutely of no service to their species. If these humble organisms could reflect on their position, I think they would be justified in taking a pessimistic view of life. The fact is that the species is otherwise so prolific, so perfectly adapted to its parasitic habitat, that it can afford to throw away a considerable proportion of its offspring in every generation, and it is only for the sacrificed individuals that the tragedy is a real one.

Since the investigations of this remarkable case of disharmony, suggestions have occurred that the phenomenon is not an isolated one. Maupas has found evidences of the uselessness of the males in certain nematode worms in which the females have become self-fertilizing hermaphrodites, and here it is true the males are produced in small numbers; yet they are produced despite their uselessness. I am investigating at the present time a parasite of solitary bees, called Stylops, in which it appears that the females reproduce parthenogenetically, and the males which are often produced in about equal numbers to the females are unable to gain access to them and are useless in the propagation of the species.

These facts, the evidences of these grave disharmonies in the sexual economies of natural species, may be useful in preparing the mental attitude with which we may approach the question of the sexual disharmonies in man. At any rate the naturalist need not consider that in passing from the animal kingdom to that of man he is entering a region where civilization has exerted some fatal and mysterious influence which is outside the order of nature.

Metchnikoff argues, and his view is well supported by the facts, that a principal source of the sexual disharmonies in civilized man lies in the fact that the period of maturity and the period when the conditions of civilization permit marriage do

not coincide, and with the increase of population and the advance of civilization become more and more sundered. There is evidence, drawn both from the condition of savage races and from the physiological constitution of man, to show that man's sexual nature is adapted for reproduction at a much earlier period of life than that at which civilized conditions permit its exercise. The result is that mankind is gifted during a considerable period of adolescence with a faculty, the use of which is necessarily restrained and forbidden until some time after the attainment of the adult state. From this fact, according to Metchnikoff, springs a great part of the evils attending the sexual condition of the human race, and though it would be absurd to pretend that this explanation covers the length and breadth of the case, yet an examination of the facts he adduces may convince us that he has assigned a true cause to many fundamental features of it. Without going behind the evidence which he cites, I would first point out that the period of adolescence when the sexual nature of man is developed is a period when the character is largely in process of formation and the restraining power of the reason is not at its strongest pitch, and then ask you to consider what proportion of the kind of evil we are dealing with is in its origin engendered in early youth or even childhood. If that proportion is considerable, a heavy responsibility rests upon a nation of protecting its youth from the evil results of this disharmony of human nature, results which may be incident everywhere, but, perhaps, nowhere more markedly than in the overcrowded dwellings of town and country.

The problem appears to me to be largely an educational one, and while upholding that ideal of education, which keeps before it as its main object the engrossment of mind and body in healthy occupations and interests, we may urge that the frank recognition of what may be termed a natural disharmony in a part of man's nature is a juster attitude of the teacher's mind than a system of mysterious taboo based on the conception that everything connected with sex is inherently evil. For the illumination of the shadows of the underworld we may prefer the even if not brilliant daylight of science to those

intermittent flashes which aim at a transcendent sublimity, but frequently only achieve an obfuscated sense of the ridiculous.

The third question proposed for consideration was, what are the conditions of development and inheritance of the secondary sexual characters? Sexual dimorphism, *i.e.*, some degree of differentiation in bodily form and function between the two sexes apart from the primary sexual qualities, is found to a varying extent in all the great groups of the animal and vegetable kingdom, and it may affect almost any organ or system of organs in very various ways. But it is possible to trace a certain community of nature in the male secondary sexual characters on the one hand and in the female characters on the other, and it is seen that the two classes of characters are to some extent parallel to the characters exhibited by the sexual cells themselves. Thus the male cell or spermatozoon is characterised by motility, a preponderance of chromatin over cytoplasm, and an absence of reserve food material, while the female cell or ovum is immobile, and exhibits a preponderance of cytoplasm over chromatin and a large store of food material or yolk. Now to some extent the secondary sexual characters run parallel to those of the sexual cells, for the male is on the whole more active than the female and its secondary sexual characters are due more to cellular activity and proliferation of tissues rich in chromatin while those of the female are concerned more with the elaboration and storage of reserve food material for the nourishment of the next generation. A survey of the animal kingdom would confirm this general statement with, of course, some exceptions, due mainly to the transference of characters from one sex to the other by a process we shall discuss later. There is then a general parallelism between the physiological nature of the sexual germ cells and the secondary sexual characters of the body in the two sexes, but this parallelism is still further and even more significantly expressed in the fact that a large number of secondary sexual characters depend for their full development upon the presence and growth in the body of the corresponding reproductive gland in which the sexual elements are being produced, nourished and matured. Such secondary sexual characters, which are

dependent for their proper development upon the primary reproductive organ, are said to be correlated with that organ, and we may speak of them shortly as correlated characters.

It has long been known that removal by operation of the reproductive glands, especially at an early age, inhibits the development of certain secondary sexual characters, and it may even cause the assumption of characters proper to the other sex. Thus in birds removal of the ovaries in the fowl, duck, pheasant or ostrich is followed by a partial or almost complete assumption of the plumage proper to the cock birds of these species. Removal of the testes in the male fowl, on the other hand, does not influence the plumage but only the comb and wattles. The plumage of the cock bird, therefore, at any rate in the case of the fowl is a non-correlated character, whereas the hen plumage of the hen is a correlated character and does not develop in the absence of the ovary. In the case of numerous moths with highly developed secondary sexual characters, both in respect to structure and colour, it has been shown by a very careful series of experiments that removal or even transplantation of the reproductive glands have absolutely no effect on the development of these characters, which must therefore all be classed as non-correlated.

We must therefore clearly recognise at the outset that secondary sexual characters may be of two kinds, 1, correlated, and 2, non-correlated. Of course it is often impossible to say of some complex secondary sexual character that it falls clearly into one or other of the two classes, but by means of experiment it is possible to analyse these cases and determine to what extent and in what particulars they are either correlated or non-correlated.

It is of great physiological interest to enquire how this correlation, where it does exist, between the development of the sexual gland and of the secondary sexual characters affecting distant and various parts of the body is brought about. It has been proved by a large number of observations that the effect is produced not primarily through the nervous system, but by some chemical change brought about in the blood or body fluids by the growth and activity of the reproductive gland, and

that this change in some way influences the cells of other parts of the body to develop in a typical way. Analogous influences are also exerted by the so-called ductless glands, such as the thyroid, thymus, and suprarenal bodies, and they are said to give rise to specific internal secretions or hormones which, travelling in the blood, affect various systems of organs. Now it is true that substances can be procured from the thyroid, the suprarenal and pituitary bodies, which when injected into the blood exert a specific effect, notably on the blood pressure, but it is quite incorrect to suppose that anything approaching the normal and complete action of these glands can be imitated by injecting extracts or preparations of them. In the case of the reproductive glands there is a voluminous literature from which the incautious and inexperienced reader is likely to conclude that the development of the correlated secondary sexual characters can be induced in an animal deprived of its reproductive glands by the injection of extracts of these glands obtained from other animals of the same species. A critical examination of this literature and a repetition of some of the more striking experiments has convinced me that this conclusion is quite erroneous and that at the present time there exists no sound evidence for the view that the action of the living cells of the reproductive glands can be replaced to any degree at all by the injection or administration of emulsions or extracts of the glands; that the existence in fact of a reproductive hormone in the ordinary sense of the word is unproved.¹

On the other hand there is evidence that the growth and activity of the reproductive glands do influence materially the composition of the blood, and that this is brought about by the cells of the reproductive glands demanding a special nutrient from the blood and thereby stimulating a definite type of activity in the nutritive and metabolic organs of the animal, so that the composition of the blood is ultimately altered in a profound degree.

By examining the condition of the blood and of the so-called "liver," which is really the sole metabolic organ, in the common shore-crab, *Carcinus*, it is possible to show that the

¹ Smith, G., and Schuster, E. Quarterly Journal of Micros. Science. Vol 57. 1912, and Anat. Anzeiger. Bd. XLI. No. 13. 1913.

composition both of the blood and of the liver undergoes the most striking changes according to the sex, period of maturity and of growth of the individual crab.¹

Stated shortly, the blood of the female during the period when the ovaries are growing and storing up the yolk becomes progressively charged with fatty material and with the yellow colouring matter, lutein, so that the blood at this period is bright yellow in colour. The blood of the male on the other hand never becomes charged with this fatty material, or with lutein, but it is frequently bright pink in colour owing to the presence of tetroerythrin, another pigment which is deposited in the skin especially at the periods preceding a moult.

Corresponding to these striking differences in the appearance and composition of the blood in the two sexes, it is found that the liver of the female maturing its ovaries is heavily laden with fat, while that of the male shows a less constant supply of fat, but an excess of glycogen especially as the moult is approached. Now we can obtain a remarkable sidelight on these phenomena from the effect which the parasitic Rhizocephala, the group of parasites which I have already mentioned, exert on their hosts, the crabs in question. The presence of these parasites with their branching system of roots, which follow all the blood channels of their host and take up nutriment from the blood, causes a profound modification of the sexual characters in the various species of crab which they infect. The most marked changes are observed in the spider-crab, *Inachus*, which is very common in the Bay of Naples, and is found infected with *Sacculina* there in great numbers. The changes consist in the partial or total degeneration of the internal reproductive organs in both sexes; while the males take on externally the structure of females, being totally transformed in respect to their secondary sexual characters towards the female condition. The infected females do not assume any male characters; on the contrary the presence of the parasite tends to make the young female prematurely assume adult female characters, so that the parasite may be said to act throughout as a feminising agent. In addition to these changes a still more

¹ Smith, G., Q.J.M.S.. Vol. 59 Part 2, 1913.

striking effect is to be observed in that the infected males, after having been modified externally into females, may in certain cases partially recover from the disease and regenerate internal reproductive organs, and when they do this they regenerate an ovary with eggs which may attain their full growth. It will be noticed that these males first of all develop the secondary sexual characters and then the primary character, viz., the ovary, of the female, so that the usual order of events is exactly reversed, and it is impossible to hold that the development of the secondary sexual characters is determined by a hormone produced by the reproductive gland, because the latter is not present at the time that the changes occur. If however we look into the physiology of the nutrition of the parasite and its effect on the metabolism of the host, we find that the *Sacculina* roots are playing the same part in the metabolism of the host as the ovary plays in a normal female individual. The roots can be shown to take up fat from the blood, just in the same way as the ovary does, and to stimulate a constant fat-production in the liver, while the glycogen storage is diminished. Changes are also brought about in the blood, but these are not so easy to interpret and I cannot enter into them here.

The result of all these considerations is to show that the effect of the reproductive gland on the correlated secondary characters is brought about by a deep-seated influence exerted on the nutritive and metabolic properties of the organism owing to the fact that the male and female reproductive cells respectively demand a special set of nutrient substances from the blood. The satisfaction of this demand leads to a series of reactions in the blood and in the metabolic organs, and this results in wide-spread alterations of various organs which thus come to exhibit the so-called correlated secondary sexual characters.

We have seen that the secondary characters are of two kinds, correlated and non-correlated. It is highly probable that the non-correlated characters were at some period of their history correlated and that they have been secondarily emancipated from their correlation by some shifting of the factors in heredity. We know that both correlated and non-correlated characters, especially the latter, can be shifted in heredity from

one sex to the other without the reproductive capacity of the individual being in any way affected. Thus there are breeds of fowl in which the females are spurred and there are others in which the male exhibits hen-plumage, but both males and females in this case are normal in their reproductive capacity. It is obvious in the case of hen-plumage that since this character is normally correlated with the presence of a functional ovary, it has been emancipated from this correlation when it develops typically in a normal functional male.

It appears that this transference or shifting of characters from one sex to the other has played an important part in the evolution of many species. Mr. Bateson in his recently published book, "Problems of Genetics," calls attention to some interesting cases in birds where local varieties are distinguished by the fact that in one variety the males are differently and more brightly coloured than the females, in another variety the males and females may be similarly and brightly coloured, while in another males and females are dully coloured like the female of the first variety. Of especial interest are those cases where an apparent inversion of the secondary sexual characters proper to either sex has occurred. Darwin¹ mentions the cases of the Painted Snipe and an Indian Quail, in which the females are larger, brighter coloured, and more pugnacious than the males, and also the case of the Cassowary, in which "the male would be thought by anyone to be the female from his smaller size and from the appendages and naked skin about his head being much less brightly coloured; the male alone sits on the eggs and takes care of the young, while the female during the breeding season exhibits a most pugnacious disposition, and her wattles then become enlarged and more brilliantly coloured." The same is true of one of the Emus, *Dromaeus irroratus*.

I have collected a few rather striking instances of this kind of inversion among insects. In some of the Lamellicorn beetles of the family Onitidae the females possess horns on the clypeus and thorax, whereas the corresponding males have them much less developed or absent. Generally speaking in Lamellicorns it is the males which possess these horns, whereas

¹ Darwin, C. The Descent of Man. Chap. 16

the females are without them or have them in a much reduced condition. It must be concluded that these Onitidæ have passed through stages in which at first the male only had the horns, then both sexes had them, and subsequently the males have lost them but the females retained them.

Another instance, affecting the colouration, is seen in a certain group of Pierine butterflies, in which as a general rule the males are brimstone yellow and the females of a much paler yellow or white. A well-known instance of this is the common English Brimstone Yellow, *Gonepteryx rhamni*. Now in the genus *Catopsilia*, by examining the various species we can find every phase in the transference of the yellow colour to the female, and its disappearance from the male, while one Asiatic species, *C. crocale*, presents a marked polymorphism, some of the males being bright yellow, others with wings partially bleached, and the females may be either white or else show every gradation to the bright yellow of the male. Finally in the common African *C. florella*, the males have completely lost the yellow colour, the wings being whitish as in our *G. rhamni* female, while the females are of two kinds, bright yellow or else white. In this case we see an inversion of the usual colour of the sexes in this group of butterflies.

These few instances show us in a striking way how secondary sexual characters may be transferred from one sex to the other in the course of evolution, leading sometimes to the assimilation of one sex to the other, and in certain cases to the complete inversion of the usual condition.

Looking at the variations in the secondary sexual characters which may occur within the limits of a particular species, it will be seen that these variations may occur as the result of quite two different processes; first an individual may exhibit abnormal secondary sexual characters as the result of some abnormality of the reproductive gland acting on the correlated characters; and secondly it may exhibit abnormal characters owing to hereditary shifting or transference of factors without there being any abnormality of the reproductive gland at all. It appears that this latter kind of abnormality more frequently affects characters which are normally non-

correlated. In man most of the secondary sexual characters, indeed, many adult characters apart from sexual differences, such as the formation of the skeleton, are to some degree correlated with the development of the reproductive gland; and for the full normal development, psychical as well as bodily, of an adult human being of either sex, the presence of a normal reproductive system is necessary. Owing to the profound and far-reaching nexus between the development of the general characters of body and mind on the one hand and of the reproductive system on the other, we should not expect to find a great deal of hereditary shifting of these characters from one sex to the other, though such a process is by no means impossible, and probably does occur to some degree. There is, however, practically no scientific knowledge of it.

This must complete our short survey of some of the lines of thought indicated by recent biological work on sex; there are, of course, many others which would well repay study and reflection. I have said nothing on the subject of sexual selection, and the influence of sex on the development of the æsthetic sense and many of the highest mental and moral qualities. If it may seem that I have dwelt solely on the lower, material, and perhaps somewhat repellent aspects of the subject, my excuse is that while lofty and beautiful things have little to gain and perhaps something to lose by being subjected to a scientific analysis, the harsh, confused and repellent facts attain a certain dignity and become more tolerable when they are seen, however dimly, as necessary parts of a cosmic order.

THE MEASUREMENT OF INTELLIGENCE BY THE BINET TESTS.

By CYRIL BURT.

PART I.

To those who are eugenists in the highest sense the consideration of a scheme of psychological tests is a matter of the first importance. For them such tests have both a theoretical and a practical interest. From a theoretical standpoint, the relations which must subsist between the study of the human mind and the study of the controllable agencies that affect the improvement of the human race have recently been discussed by Mr. McDougall.¹ "It is," he urges, "to the application of experimental methods in the form of mental tests that we must chiefly look for the progress of our knowledge of mental heredity." In a practical sphere, psychological tests have recently acquired an especial value as our only reliable means of diagnosing mental deficiency. By mental deficiency is commonly meant a lack of practical intelligence and scholastic educability due to an abnormality existing virtually from birth. The task of ascertaining what children suffer from such inborn mental defects has, by an Act of Parliament now about to come into force been made compulsory. Upon these grounds, we are faced with an urgent question. What scheme of tests, suited for either theoretical or practical purposes, is now available?

The psychological methods devised for investigating inborn intelligence have commonly been classified into two main groups:² the correlational methods and the age-scale methods, or, as I should prefer to describe them, the methods of internally and of externally graded tests. The former or correlational methods have been elaborated chiefly by English investigators—Sir Francis Galton, Professor Karl Pearson, and Professor Spearman. The age-scale method originated in France, and is generally associated with the name of its author, the late

¹ This *Review*, "Psychology in the Service of Eugenics," Jan., 1914, p. 295 seq.

² cf. William Stern, *Die Psychologischen Methoden der Intelligenz-prüfung*. Leipzig, 1912. This is by far the best review of the entire subject. The relevant chapters in Meumann's *Vorlesungen zur Einführung in die Experimentelle Pädagogik*, Vol. II., 2nd edition, Leipzig, 1913, brings the review of the literature down to a more recent date.

Alfred Binet. Binet's method has of late achieved great popularity. In France, in Belgium, in Switzerland, in Italy, in Russia, and in Sweden, more recently in England and in Scotland, but above all in America, his scheme has been tried and re-tried with almost universal satisfaction. During the last year or two its use has spread very widely among teachers and doctors in this country. Its use has been recommended by the Board of Education; and a brief summary published in its reports.¹ Indeed, both in scientific investigations and in practical diagnosis, the Binet tests threaten to eclipse almost all other methods of measuring intelligence.

In this country, at any rate, no systematic discussion either of its merits or of its limitations has yet appeared. Accordingly, it seems desirable to emphasize the admittedly tentative and restricted nature of the scheme, before its employment becomes prematurely stereotyped and fixed.

At the outset, it is important to remember that there is not one Binet scheme, but several. From 1895 onwards Binet published three or four distinct proposals for testing intelligence, all based upon the same conception, but each differing from the other in important details.² Nor is the latest revision the one that has been most commonly used by other investigators; nor was it considered final by Binet himself. From a letter which I received from M. Binet only a few months before his death it is clear that he was still contemplating the possibility of further improvements.

In consequence of this arrested evolution of the Binet scheme, two facts emerge. First, Binet's own conception of his aim and method continually changed with advancing knowledge. Secondly, since Binet's death, thanks largely to the

¹ cf. *Annual Report for 1912 of the Chief Medical Officer of the Board of Education*, London, 1913, pp. 373-5.

² The chief publications are (1) *L'Etude Expérimentale de l'Intelligence* (Paris, 1903)—summarised in C. S. Myers, *Introduction to Experimental Psychology*, chap. VII., pp. 121-7.

(2) *L'Année Psychologique*, Vol. XI., 1905. "Méthodes nouvelles pour le Diagnostic du Niveau intellectuel des Anormaux," and other articles—summarised in Whipple, *Manual of Mental and Physical Tests*, p. 473 seq.

(3) *L'Année Psychologique*, Vol. XIV., 1908. "Le Développement de l'Intelligence chez les Enfants" (in collaboration with Dr. Simon)—summarised in Whipple, p. 493 seq. (this is the scheme hitherto most commonly employed).

(4) *L'Année Psychologique*, Vol. XVII., 1911. "Nouvelles Recherches sur la Mesure Intellectuel chez les Enfants d' Ecole."

enormous impetus his own writings bestowed, knowledge has advanced still further. In what follows, I shall endeavour to discuss, in the light of Binet's own utterances, and by the aid of subsequent researches both with the age-scale method and with the method of correlation, two broad questions: What do the Binet scales test? How successfully do they test it?

I.

The first half of my paper, then, concerns the object of the Binet scales. What is it they claim to measure? And what is it they really measure?

As to what is precisely that his schemes are intended to measure Binet is never very explicit. Briefly, his aim appears to have been the measurement of native intelligence in terms of its development. Upon analysis, such an aim seems to rest upon three assumptions: (1) that variations in intelligence may be considered as different degrees of one and the same unitary function; (2) that this unitary function underlying intelligence is, in its various degrees, native or inborn; (3) that differences in the amount of native intelligence possessed by different persons can be measured in terms of age, that is, in terms of differences in the degree of development of intelligence possessed by the same persons at different years of their life. Evidence in favour of these questionable propositions Binet contributes only in a very incidental and occasional way. His followers for the most part pass the questions by.

(1) Is intelligence dependent upon a single unitary factor or is it not? The alternatives are clearest if we picture them in crude physiological terms. On the one hand, we may regard the brain as an aggregate of organs, each as independent of the other as the eye is of the ear, or the organ of taste of the organ of smell; on the other hand, we may regard the whole nervous system as consisting of a single tissue throughout, like the blood or the muscular system, tending like them to be equally well or ill developed in all its parts. A scheme of tests devised upon the one hypothesis obviously would cease to be satisfactory if the other proved to be true. Is there, then, such

a thing as general mental ability? Or is intelligence but the net resultant of a number of relatively independent and isolated functions?

To this problem Binet's answer quite rightly was a compromise. Data were not then available for a final or decisive verdict. In *Les Idées modernes sur les Enfants* it appears that he could not commit himself entirely, either, with Professor Spearman, to the hypothesis of a central factor, or, with Professor Thorndike, to the hypothesis of a multiplicity of independent and specific factors. When introducing his first scheme,¹ he briefly indicates the sense he attaches to "that word, so vague, so comprehensive—intelligence." He admits that "almost all the phenomena with which psychology is occupied are phenomena of intelligence—sensation, perception, . . . just as much as reasoning." Yet, we cannot "put the whole of psychology into our tests." What is to be the ground of our selection? "It appears to us that there is in intelligence a fundamental organ, whose absence or alteration is of the greatest importance for practical life: this is, judgment, or in other words, common sense (*le bon sens, le sens pratique*) . . . With Helen Keller, . . . one may be blind, and deaf, and mute, and yet extremely intelligent, "if only one has judgment. If, therefore, tests of sensation or memory are introduced, it is only in order that by their means we may come indirectly to a determination of the capacity of judgment. *Bien juger, bien comprendre, bien raisonner*,—compared with these "the rest of intellectual psychology is of very little importance." Here we have hint of two of the most valuable lessons that psychology owes to Binet's work. First, individual differences, and particularly differences in intelligence, are revealed, not so much in the older instrumental tests of simple sense-perception, movement, or reaction-time, as in tests which approximate to the concrete conditions of everyday life, tests which need no apparatus but "a pen, some paper and a little ink," tests, in short, which involve the higher, more rational, and more complex mental processes. Secondly, there is not, nor ever can be, any one royal test of intelligence. Number and variety are

¹ *L'Année Psychologique*, 1905, pp. 196-7.

essential. Just every organ of the body contains many different kinds of cells, so the "fundamental organ" of intelligence comprises many different kinds of mental activities.^x Accordingly, "the tests must be heterogeneous, so that we may rapidly embrace a wide field of observation."

The provisional character of this position gives a very provisional character to the selection of the tests. Heterogeneous they are indeed. There are tests of every day knowledge—naming the days of the week, the months of the year, the coins of the realm. There are tests of scholastic attainment—reading, writing, and dictation, on the literary side; counting, addition, and subtraction of money, on the mathematical side; drawing from copy and from memory, upon the manual side. There are more strictly psychological tests—tests of sensory discrimination for lines and weights; tests of controlled and uncontrolled association; tests of memory, in the form of immediate reproduction, recurring fairly systematically at intervals of two or three years; tests of observation, in the form of describing pictures, also recurring at three separate stages. Tests of motor co-ordination are but scantily represented. In the higher years, there are tests of a linguistic and logical character—defining concrete and abstract words, giving differences between pairs of concrete and abstract words, rearranging words to form a sentence, filling in the words missing from a mutilated text. There are even tests that approach the moral and aesthetic side—a test of the power to resist suggestion, a test of the power to compare ugly and beautiful faces, questions as to what should be done in emergencies both practical and ethical, "What would you do when your house is on fire?" or "when you have broken something that is not yours?"

It is clear that the tests were picked for their practicability; not upon any prearranged plan. Their connection with the "fundamental organ" of intelligence is left practically undetermined. It yields no systematic scheme running consistently through all the groups of tests allotted to the successive years. Indeed, the formulation of such a system would have

^x See especially *L'Année Psychologique*, 1909, "L'Intelligence des Imbeciles," p. 145.

been premature. "Those who take up the work will find better tests; we are far from pretending that ours are the best." Experience has shown that some tests are, in fact, much better than others. Their value has proved to be amazingly unequal. Mechanical processes, like reciting the days of the months, naming the date, or counting coins—these show very little positive relation to intelligence. On the other hand, the definition of terms and the interpretation of pictures, especially with an improved set of terms and pictures, prove extremely fertile and suggestive. For the rest, scarcely any comparative work has yet been done, either by Binet or his successors, upon the psychological significance or the diagnostic value of the several tests. We need, first of all, careful introspections to determine precisely what conscious process it is that each test evokes. The child has to juxtapose two triangles to make an oblong, to guess a pattern formed by cutting a sheet first folded into four, to detect the features missing from the drawing of a face, to count backwards rapidly: how far do all these depend simply upon the specific capacity of visualization? Again, we need careful comparisons between the child's response to simple interrogation and previous observation of the child's behaviour under the multiple stimuli and confusing motives of everyday life. Is the child who can best describe what he would do if his house was on fire the child who would act most intelligently in the event? Curiously enough, one of Binet's own test-problems is "why should you judge a person by what he does rather than by what he says?" Accordingly, would it not be better to keep the child doing things instead of saying things? For answering questions little else is required besides a ready tongue. Again, if a child does not answer within the allotted number of seconds, how far is this due to lack of intelligence, how far to shyness and timidity, how far to a deliberate intention to be sure, though slow? We need, therefore, a hierarchy of correlations showing how far the various conscious processes evoked and various aspects of behaviour tested are related to one another, and, consequently, to the underlying general intelligence that is postulated. This has never systematically been done.

Nevertheless, those who have employed the method of correlation with other experimental tests have already done much to verify Binet's hypotheses and to clarify his suggestions. The most recent work makes in favour of what Professor de Sanctis has recently termed the theory of two factors. To Professor Spearman we owe a series of brilliant demonstrations of the existence of central factor, commonly termed, general ability.¹ But he himself has insisted that every intellectual performance depends also upon a second group of constituents, namely, specific factors. Their independence is most clearly observed in cases where children, otherwise highly intelligent, are almost unable to read, to calculate, or to visualize. In multiple correlation we possess an instrument for analysing still further the nature of these general and specific mental capacities, and for indicating the kinds of tests which are most closely connected with each. Hunting for intelligence tests before intelligence as such has been isolated or analysed is like seeking an antitoxine for an obscure fever before the bacillus has been discovered. Once the analysis has been made the selection of tests will follow.

(2) The next problem is whether general ability or intelligence is inborn; and, if so, whether the methods proposed test this inborn quality rather than knowledge that is learnt or skill that is acquired.

Professor Karl Pearson and others have found that the degree of resemblance between parent and offspring or between brothers and sisters is much the same for intelligence, estimated by teachers' impressions, as it is for other mental and physical characteristics; the co-efficient of correlation is, as a rule, approximately .5. Subsequent experimental investigations have also indicated that general ability, estimated by intelligence tests, is largely hereditary and, therefore, innate. The evidence for the innate character of defects of intelligence is even more convincing.

It is native intelligence and inborn defect that the Binet scale claims to test. It deals, we are told, with "intelligence

¹ cf. Spearman and Hart. "General Ability, Its Existence in Nature." *British Journal of Psychology*, Vol. V., 1912, p. 53. Spearman, "The Theory of the Factors," *The Psychological Review*, Vol. XXI., No. 2, March, 1914.

pure et simple" distinct from "*degré d'instruction*," or "*degré de culture*," in a word, with "*intelligence naturel*." Yet, curiously enough, Binet classifies the various forms of defective intelligence upon the basis of capacities which are largely acquired. Idiots are those who possess no use of language: imbeciles use language in its spoken form, but do not possess the more complex means of social communication, reading or writing; the feeble-minded or debiles possess both. Speech doubtless rests in part upon a hereditary tendency to articulate; and inability to read or to write has been supposed, in some cases, to be due to a congenital defect of specific areas of the brain. But the use, and especially the efficient use, of language is, in all its forms, an art which has to be acquired. In deference to criticisms upon these lines, Binet, in his latest revision, dropped the two tests of reading and the two tests of writing, which his classification had originally induced him to insert. But the entire scale is still left with a marked linguistic bias. Out of fifty-four tests, forty-three, that is about four-fifths, are verbal. Now it may be plausibly maintained that success in rapidly understanding and rapidly and logically answering questions depends, primarily, upon home and school training; and only in an indirect and negative fashion upon innate intelligence. It is from this very point of view that Binet himself criticises the methods in vogue among physicians and psychiatrists. They, very largely, are accustomed to determine the mental level of their patients in the course of an apparently ordinary conversation. Lists of questions suitable for such interviews have often been published in the form of topical questionnaires. Binet prints one such list, and acknowledges his indebtedness to another. They have obviously influenced him to a considerable extent. Yet he criticises them severely. "The method (he says) is at the bottom nothing but an educational examination, a fresh certificate of studies, having as its chief advantage the fact that the questions are fixed in advance, instead of being dependent upon the bad temper or bad digestion of the examiner Hence there is no room for astonishment if from this medley of questions we derive no notion of the gradation of intelligence."¹

¹ *L'Année Psychologique*, 1905, p. 190

Special, as well as general, training may affect the results. Both linguistic and non-linguistic tests are alike extremely teachable. Arranging weights, making phrases, detecting omissions in pictures, noticing self-contradictions in sentences, juxtaposing two triangles to make a rectangle, defining prescribed objects, answering prescribed questions—these are all simple puzzles and tricks whose teaching is coming to be part of the regular stock-in-trade of the up-to-date teacher. They are tests, too, which can easily be described by children to each other. This teachability would not be serious if it merely resulted in a slight and measurable improvement in an internally graded test; but with externally graded tests, each allowing but two possibilities, namely, failure or success, familiarity may be the decisive factor. A repeated examination with the same tests by the same or different persons, a procedure which is so common and so necessary, is vitiated to an unknown degree by previous practice. No doubt, whatever tests are eventually selected must inevitably be influenced in some degree by acquired dexterity or repeated training: but, if so, the only scientific procedure is to measure the degree of the influence and, according to its amount, either discard the test or allow for practice. This can only be done by a statistical method, like correlation.¹

(3) We now come to the most essential part of Binet's scheme—the relation of intelligence to age. Let us consider first his attempt to determine the general course of mental development in the average child. It is one of the most important achievements of Binet's work to have drawn attention to the importance of the notion of intellectual development. But it was only towards the end of his investigations that he realized how complex a thing this concept was. In an important passage in one of the later articles he distinguishes between what he terms "maturity" of intelligence and "rectitude" of intelligence.² It is in rectitude of intelligence quite as much as in maturity of intelligence that defectives are especially lacking. Maturity is measured by the number and difficulty of the tests successfully passed. But the tests have been devised so as to

¹ This has been done for a few internally graded tests by Dr Whitley, *An Empirical Study of Certain Tests for Individual Differences*. N.Y. 1911.

² *L'Année Psychologique*, 1908, p. 80.

elicit not only failures but also absurdities. The number of absurdities committed yield a rough index of the rectitude of intelligence. Defectives, according to Binet, commit on an average at least three absurdities; normals, hardly 0.5. We have here an important indication of the limitations of the significance of intellectual development. Having distinguished rectitude and maturity, he goes on to distinguish within maturity, on the one hand, the natural growth or augmentation of the faculty of understanding or judgment, and on the other hand (this is secondary and may be absent) the adventitious increase in knowledge, skill, and experience artificially acquired. We may carry the analysis still further. Natural growth may itself include two processes: first, new functions ripen spontaneously and suddenly emerge at definite epochs; walking, talking, sexual activities, and doubtless other quasi-instinctive processes seem to have almost as definite a period for their eruption as the second teeth. Secondly, old functions seem to pass through a cycle of different phases corresponding to different ages: fear, for instance, may be excited at one period by noises, at another by animals, at yet others by human beings of threatening aspect, by strange situations, by the supernatural, by disease, or by social and moral crises; observation may be directed first to objects and persons, later to their actions, later still to their temporal and spatial relations; and last of all to their attributes and qualities. Acquirements may be similarly analysed. There are those acquired at no fixed date by training at home, those acquired at relatively fixed periods by training at school, those acquired as a result of the child's own attention and retentiveness. These are very unequal in their diagnostic value.

It is clear then, that intellectual development is not quite the simple concept that most investigators have assumed. For Binet, at any rate it is, "un tout bien plus complexe." But, it may be urged, does not our simple central factor provide a simple central line of development? This question involves issues as yet uninvestigated. It is quite conceivable that inborn mental ability is given once and for all at birth; and does not develop, or change in any way except with changes of health.¹ At any

¹ James, for instance (*Principles of Psychology*, Vol. I., p. 663-4), held such a view as regards native retentiveness or memory.

rate, experimental investigations show that, when measured in relative independence of acquired capacity, elementary intellectual functions show very small changes from year to year. Thus, in a test of the reproduction of logical opposites, the increase in ability from year to year is extremely small when compared with the variability of various individuals of the same year. The average annual increment from age 7 to age 18 is only +16·0, starting from 35·0; but the average probable error¹ for a single year is +27·0. So with other tests. The difference between the average for one age-group and the average for the group a year older is almost swamped by the wide differences between the individuals composing that group. Yet the Binet scheme assumes the possibility of measuring stages of development accurately to one-fifth of a year. This implies a grave underestimation of the amount of overlap that is now known to obtain between the various years.

But it still remains possible that, in the average, the small annual increments in most years may obscure a single large increment in one particular year. Thus, the memory-span for figures, which at the age of four is 3, may advance suddenly to 5 at the age of eight, and, with an equal suddenness, to 7 at the age of fifteen. Hence, different tests would appear at different periods: tests of motor co-ordination at one period, tests of sensory discrimination at another, tests of the elements of reading, writing, and arithmetic at another, tests of reasoning and abstraction at yet another, according to the nature of the sudden advance made at each age. This is what the scheme actually shows. The assumption involved appears to be twofold: during any given period a development in some particular capacity may be taken to imply a development in intelligence generally; but a development in general intelligence does not necessarily imply a development in all the particular capacities at once, or in the same particular capacity at all periods. If, however, this be so, clearly the only thorough procedure will be, first, to measure the

¹ The "probable error" marks the limits above and below the average, within which one-half of the group will be found. Thus, the average and probable error for 13 year old children in the test mentioned are 115·2 and 43·5; i.e., the central half of the group alone covers a range extending from 71·7 to 158·7. This is a greater range than that covered by the entire period of six years measured.

same capacities at every age throughout and discover precisely at what year, if any, their sudden augmentation falls; and, secondly, to determine the degree of correlation between the development of the several capacities measured and general intelligence as a whole. In any case, to assign a child a single flat mental age as though all his powers grew, and must grow, steadily side by side cannot but be misleading. And if, further, as we have reason to suppose, the period of quickest growth in a given capacity is not the same for all individuals, if for instance, the many London schoolboys develop the power to resist certain suggestions long before they can define certain abstract terms, while others, like Binet's subjects, apparently develop both powers in the same year—then the entire question is incredibly complex.

The differences in development shown by the two sexes, and the inadequate provision made for testing the developments during the period of puberty and adolescence (quite the most critical developmental period of all), are more familiar topics of criticism, upon which I have no room to enlarge.

In spite of all these criticisms, it is, I am convinced, in the vivid preliminary picture given of the general course of the average child's mental development that the most valuable part of Binet's scheme consists.

The point, however, which has attracted the greatest commendation has been the endeavour to express individual differences, and especially subnormal differences, in terms of the average development of the normal child. Intelligence, he suggests, may be measured in terms of mental years; and the scheme which serves to measure the differences between the same mind at different ages may also serve to measure the differences between different minds, irrespective of their age. Curious as it may appear, while the details of the scheme have constantly been criticised, this, the central feature of the whole proposal has scarcely ever been questioned. It is to this point that I would direct especial attention.

To begin with, we must admit that for many practical purposes, where not a technical but rather a popular estimate of intelligence is required, the conception of a mental age will

always be found useful. It must further be admitted that the analogies between states of defect and states of immaturity, which so constantly struck Binet, are points of the utmost interest. Yet, I believe, the similarity was, at first, overestimated. "So numerous and so curious are the resemblances (he writes) that on reading the responses of a child whose age was not given, one could not tell whether it were normal or abnormal."¹ In his later work, however, he himself showed that defective child would commit absurdities which a normal child, however young, would rarely make.

Let us now consider the assumptions upon which his principle of measurement is based.

It assumes, in the first place, that all differences in intelligence may be regarded as falling within a single dimension and lying along a single scale. Crudely put, it means, so far as normal intelligence is concerned, that the essential differences between Smith, Brown, Jones and the rest of mankind may be regarded as points in the same straight line through which the greatest of them all, Shakespere, let us suppose, passed successively in the course of his mental evolution. As regards abnormal personalities, it means, as Binet avows, that all forms of mental defect, except instability (by which he seems to mean emotional and moral defect) are cases of arrested or retarded general development. Both implications are untenable. Indeed, the failure of Binet's successors to realize the extreme heterogeneity of the class known as mental defectives or "anormaux" is amazing. We have seen that Binet himself came somewhat hesitatingly to separate abnormalities in the "rectitude" of intelligence from deficiencies in its "maturity"; and that he apparently regarded the normal maturation of intelligence as involving sudden changes in kind rather than gradual changes in degree. Later, he recognised an important modification of intelligence or "judgment," which he terms "*esprit faux*." Here the several faculties are developed or retarded disproportionately. Consequently, the condition "does not correspond to any regular stage of psychological evolution."

¹ *L'Année Psychologique*, 1905, p. 320-1.

Secondly, his principle assumes that the annual increments of intelligence may be treated as equal in amount; in other words, that the curve of intellectual development is best represented by an inclined straight line. How far is this true? It is commonly supposed that mental development runs parallel to physical growth; and that this in turn may be fairly estimated by the average heights and weights of children of different ages. During school life, the general changes in weight, and more especially in height, may be roughly represented by straight lines. This, however, obscures two well-known facts. First, growth does not go on for ever. If we regard the course of growth as a whole, the curve becomes logarithmic in character; height and weight increase, but the rate of increase declines. Secondly, the rate fluctuates periodically before it finally falls. Growth is spasmodic; the curve representing it is not a simple arch; it undulates as it rises. At the ages of about six, nine and fourteen the annual increment in height may rise to nearly $2\frac{1}{2}$ or 3 inches; at about eight and again at about twelve it may sink to hardly more than half that amount.¹ To say that from five to fourteen children grow on an average 2 inches every year is to obscure this familiar fact. In explanation, it is commonly stated that in growth periods of advance alternate with periods of adjustment. If this is true of physical life, it is far more likely to be true of mental life.

Apart from the supposed rough parallelism between physical and mental development, little is known about the relation of mental capacities to age. Previous to Binet's work, the functions studied had been for the most part simple processes like sensory discrimination and rapidity of reaction. Memory is perhaps the capacity whose development has been most frequently investigated. On the whole, the various forms of memory tend to improve in early years with age. There are, however, periods of rapid development followed by periods showing no improvement or even retrogression. As a rule, the greatest improvements occur between the ages of 10 and 12; after this development is retarded and there are symptoms

¹ For recent figures cf. *Annual Report for 1912 by the Chief Medical Officer of the Board of Education*, pp. 399-407.

of absolute decline. Considered specifically, the various forms of memory develop at different rates, and at periods that do not coincide either in the two sexes or in different social classes. It would be quite futile to attempt to measure differences in memory in terms of a memory age. What has been found in the case of memory probably holds true of other mental capacities. Before and after entering school, before and during adolescence, a year's growth in intelligence means very different things. The course of mental development is thus by no means a simple steady rise.

Except for rough and popular purposes, then, Binet's intention of measuring native intelligence in terms of mental years seems impracticable. It is like measuring stature with an elastic rod, warped in two or three places along its length, and telescoped in upon itself at the upper end.

(To be continued in the next number.)

NOTES AND COMMENTS.

Galton Day.—On Monday, February 16th, took place the first celebration by the Society of the anniversary of the birth of Sir Francis Galton. The celebration was inaugurated by a dinner at the Hotel Cecil, attended by 140 persons, members of the Society and their friends. The guests of the Society included Lord Sydenham, Sir Archibald Geikie, Sir Francis Darwin, and Professor Bateson. Among the congratulatory telegrams received was one from Dr. Ploetz on behalf of the “Gesellschaft für Rassenhygiene.” Immediately after the dinner the company repaired to the lecture room, where a considerable audience had already assembled. Here the proceedings were opened by Major Leonard Darwin, who, in introducing the lecturer, explained the object of the gathering in the following words: “In the first place we desire to satisfy the very natural wish which is felt for some outward expression of our firm belief that posterity will owe a great debt of gratitude to the man who first made it possible to start a definite campaign in favour of racial advancement; and, in the second place, we hope by means of these gatherings to make more widely known the necessity for eugenic reform. We trust, therefore, that this may prove to be the first of a long series of such anniversary meetings; meetings at which addresses will be delivered on subjects connected with eugenics, thus ensuring that the meaning which Galton attached to that word shall never be lost sight of. It may perhaps be said that there is a danger in establishing an annual gathering in honour of any scientific thinker, namely, the danger that we may thus tend to cause his conclusions to be accepted as scientific dogmas outside the region of controversy. This harmful result from the celebration of a Galton day is, however, very unlikely to be felt; because all the writings of that keen thinker tend to show that he held that our scientific faith must include a belief, not only in the evolution in the past of living things, but also in the continued evolution in the future of scientific theory. The aim of eugenics according to its founder is to increase the

probability of the men of the future being hereditarily endowed with noble qualities; and Galton not only taught us how that aim might be accomplished, but he also showed us in his own person what those noble qualities were." Sir Francis Darwin then delivered his address which we publish in full on page 1. The proceedings terminated with a vote of thanks to the lecturer, proposed by the Dean of St. Paul's and seconded by Mrs. Scharlieb, and a vote of thanks to the chairman, proposed by Major Hills and seconded by Mr. Whetham.

The Mental Deficiency Act, which comes into force on April 1st, may be regarded as a very useful instalment of legislation. It is, perhaps, the only piece of English social law extant, in which the influence of heredity has been treated as a practical factor in determining its provisions.

The Act does not go as far as some of its promoters may have wished, yet most good things grow slowly, and legislators were well advised, in this instance, in adopting cautious measures, where so much is debatable, so much untried, or still in experimental stages. Much of its general utility even now depends upon two factors, the passing of the Elementary Education (Defective and Epileptic Children) Bill, introduced by Mr. Joseph Pease this Session, and the increase of the Treasury grant. Without the clauses making it compulsory to establish special schools, children above school age needing institutional care or guardianship will be left to drift into danger, save in the unlikely event of the parents of the very worst cases notifying the local authority of the necessity for the certification and segregation of their defective children. Without an increased Treasury grant, the clause in the Act (30 [i]), which makes it non-obligatory for a local authority to provide either institutions, or guardianship, for persons within their area, whom they ascertain to be mentally defective, *if the money provided by Parliament is less than half the net amount of the cost*, will affect more areas than is realised, as the Treasury grant is at present only £150,000. It is permissive, however, for any local authority to act without the grant, a fact which should be borne in mind by those anxious to promote the movement. So far the most active authorities are the Poor Law

Guardians. Almost every union in the country is discussing the possibilities of institutional treatment.

In addition to the existing colonies connected with the London and Birmingham Boards of Guardians, twenty-four unions in the North of England have already bought land for this purpose; others have their plans almost completed. Many county councils, on the other hand, have not even constituted their "committees for the care of defectives," yet there appears already, as at Wolverhampton, some little danger of disagreement between these rival authorities as to their relative spheres of action. This spirit is to be deprecated, as there seems more than enough for all to do in carrying out the provisions of the Act. The formation of the Local Committees, the maintenance in institutions or provision of guardianship for defectives, whether under Poor Law or otherwise, the establishment of special schools, and the co-ordination of voluntary effort will require the devotion and interest of every agency available for the aid of defectives for some time to come.

A. H. P. KIRBY.

The Inebriate's Bill, of 1914, should be read in conjunction with the last published report of the inspector under the Inebriates Acts. This partakes more of the nature of a general than of an annual report. After defining carefully what he means by an inebriate, Dr. Branthwaite makes a rough estimate of the prevalence of inebriety. "There are about 48,000 inebriates of all classes in England and Wales at the present time (about 1·42 per 1,000 of the population), of which number about 16,000 are persons in private life—whose habits have not led to conviction in police courts—and 32,000 known to have criminal or disorderly tendency."

With regard to the treatment of the non-criminal inebriate he makes the following recommendations: (1) Legislation should allow "an inebriate to enter into a legal pledge to abstain, to surrender himself to the control of some friend whom he can trust; such friend being in the position of guardian, with power to prevent the patient from obtaining drink during time of stress, when good intention would otherwise succumb to abnormal desire." (2) "If these mild

measures fail, . . . then the inebriate should be encouraged to enter an institution for more effective control and supervision." (3) As experience shows that only an insignificant proportion of inebriates will submit voluntarily to institutional control, it is desirable that powers should be available for the application of restraint, under proper safeguards, "during the early days of an inebriate's history." "When inebriety is clearly defined, recovery can never be guaranteed; but it is probable if restraint be applied during early days, and improbable later." "For a long time past our national respect for the liberty of the subject has seemed to contra-indicate the compulsory application of restraint to persons who are inebriates without being disorderly or criminal. But, however justifiable the delay so that experience may prove necessity, the time has come when there can be no further doubt as to the desirability of making proper provision. Nearly 35 years' experience of legislation for inebriates has amply proved that the existence of compulsory power is unavoidable, and has made it clear that further progress is impossible so long as things remain as they are."

This is strong language for an official report, and Dr. Branthwaite's views concerning the treatment of criminal and disorderly inebriates are expressed with equal force and directness. "The necessity for compulsory restraint in such cases has been accepted and acted on, for many years past. All that is necessary now in regard to this phrase of the subject is to emphasize the need for the removal of difficulties that now prevent the early and more efficient exercise of restraint for purposes of reformation, as distinct from restraint for the purpose of punishment." "All efforts at amendment of the law should be directed towards rendering the imprisonment of inebriates, as a preliminary to their treatment in reformatories, a thing of the past, so far at least as this is possible." "It is clear that repeated short penal sentences have no deterrent influence over the inebriate." "It is difficult to describe the proceeding"—a few weeks' imprisonment, spasmodically applied to habitual drunkards—"as other than inhuman, useless, and an absolute waste of public money."

After coming to these conclusions Dr. Branthwaite proceeds to summarize the findings of the three committees of enquiry concerning the best methods of dealing with habitual drunkards. These were the Select Committee of 1872, the Departmental Committee of 1892, and the Departmental Committee of 1908. The reports of all three committees are in practical agreement not only with regard to essentials, but also with regard to details, but legislation based on their findings, namely, the Habitual Drunkards Act of 1879 and the Inebriates Act of 1898, has fallen far short of carrying out their recommendations, and thus a further amending Act is urgently needed. Dr. Branthwaite appears to hold a sanguine view as to the probable reforming effect of reformatories, provided that the inebriate finds shelter there early enough in his career, and it is natural that in advocating amendments of the existing law he should not in any way belittle the possible good to be expected from them. But the prevalence of feeble-mindedness among the inmates of reformatories makes it very doubtful whether short detention even at the most hopeful time would have any lasting result in the majority of them. In the present report no direct statement is made about the rate of occurrence of mental defect, but from other reports it appears to be present in more than half the persons admitted. As among those who were sent to reformatories during 1912 53 out of 305 could neither read nor write, and 149 could only do so imperfectly, it seems probable that little change has occurred in this respect in recent years. It may thus be found that the proper function of the reformatory is to provide a more or less permanent place of shelter for the inebriate.

The Bill of 1914 gives practical effect to Dr. Branthwaite's recommendations which are themselves in accord with those of the last Departmental Committee. What its fate will be this session is still doubtful as its second reading appears to have been indefinitely postponed. It is to be hoped that in spite of the great amount of Parliamentary time likely to be occupied with more contentious measures it may not be completely abandoned.

Eugenics and Education—We note with satisfaction that the efforts of the Eugenics Education Society to further the view that the idea of racial responsibility should be among the usual lessons learnt at school has not been without result. In various parts of the country there are indications that the importance of this question is recognised and that a considerable body of opinion in the teaching profession is agreed on what preliminary steps should be taken. At the North of England Education Conference, held at Bradford at the beginning of January, two papers were read by well-known eugenists. Dr. D'Ewart, Hon. Secretary of the Manchester Branch of the Society, took "Eugenics and Sex Training" as his subject, and Miss Norah March, also a member of the Society, dealt with "Sex Education and Eugenic Training in the School." Regret is often expressed by those eugenists not in touch with the education problems of the elementary schools that eugenics should so constantly be approached as if it were almost synonymous with sex hygiene, but to those who have given close consideration to the matter the conclusion seems unavoidable that although the two subjects are theoretically distinct they cannot be practically sundered. A sound eugenic ideal and a sense of individual responsibility cannot be imparted except on the basis of an elementary knowledge of the physiological laws of reproduction and development. Miss March in her paper outlines the possible methods of approaching the subject, in a way which will be of great assistance to the teacher. She clearly states that "the ultimate aim of sex-education will be attained when one considers its application in education for parenthood." It is recognised that a large part of such education is rightly the privilege of the parent, but in many cases the parents feel unable to give it themselves and welcome the assistance of the teacher. Miss March indicates how the various subjects of the ordinary school curriculum, "literature, history, human geography, and Bible knowledge," may each be utilized in implanting the eugenic ideal, and goes on to say "It is undesirable that there should be any special course of lessons in moral training, such teaching should find its way unobtrusively, yet very definitely, into the ordinary subjects."

Before any teaching, direct or indirect, can be given in the school, it is essential that the teachers should learn something of the subject themselves. An attempt to provide for them opportunities for so doing was recently made in the special course of lectures for teachers, organized by the Society and given by Professor J. A. Thomson and Dr. Greenwood. We learn with pleasure that the University Extension Board for London will probably include lectures on eugenics in its autumn programme. Cambridge University has also recognized the importance of the subject by authorizing a course of local lectures to be delivered at Leicester by Dr. Maret Tims. Dr. Maret Tims takes for his subject "Man's place in Nature: Biology and Eugenics," and after an examination of the syllabus we have no hesitation in saying that the subject is dealt with by him in such a way that anyone taking full advantage of his lectures will acquire a sound and comprehensive, though necessarily elementary, knowledge of the subject. The consideration of man's place in nature, involving as it must the idea of evolution and some knowledge of structure and function and of the nature of social life, is, perhaps, the fittest introduction to eugenics that could be devised, yet hitherto the subject has seldom if ever been approached in this way.

Before closing this brief review of "Eugenics and Education" we take the opportunity of emphasizing the vital importance of obtaining the consent of the parents to any proposal that their children should be taught such subjects as eugenics and sex-hygiene. Without this consent and co-operation, however good the intention of the teacher, disastrous results may follow an attempt to introduce these subjects. This has been shown particularly by the case of Miss Oldham. On the other hand, in those cases in which the parents have had the teacher's aims and methods explained to them, permission has been given by the indifferent and cordial co-operation by the intelligent parents.

CORRESPONDENCE.

PRIMOGENITURE AND ABNORMALITY: A POSSIBLE FALLACY.

Probably the earliest observation that consumption seemed to pick out the eldest born for its victims was made in 1906 by the present writer at the Crossley Sanatorium. For the purpose of mathematical confirmation, the data were offered to Professor Pearson, who kindly examined them. The result was *A First Study of the Statistics of Pulmonary Tuberculosis*, in which especial incidence of consumption upon first and second born children was described; the only related observation quoted being from an article in *Biometrika* (on the inheritance of duration of life) that "the elder adult sister and adult brother live on an average four years longer than the younger adult sister or brother."

Following this brochure on consumptives there came, also from the biometric side, two others in which I had no part: on lunatics and on criminals. In both classes (the figures for the latter may be found in Pearson's Boyle Lecture) very much the same sort of incidence was described, while later a third, albinism, was added.

Meanwhile, looking round for a larger material of consumptives upon which to test further the hypothesis, I had found it in five German works¹ and in some further pedigrees of my own. In an article (*The Lancet*, Oct. 7th, 1911) I showed that all save one of these sources yielded on analysis special incidence of consumption upon first and second born children. A bibliography of the subject was appended, going as far back as 1866, giving authors who, I now find, had asserted eldest born incidence amongst idiots, amongst criminals, and in men of genius. The last observation came from that distinguished pioneer in other fields, Dr. Havelock Ellis, who was the first to posit a multiple abnormal tendency on the part of the eldest child.

Of the chief of the foregoing investigations the exact figures are now given. To show them as succinctly as possible one contrasts two percentages—first, the percentage of eldest born children in the whole material of each inquiry; secondly, the percentage of eldest born children in the particular class examined. Thus Sir A. Mitchell² says: "Of all the children born in Edinburgh and Glasgow in 1855, 22·8 per cent. were first pregnancies, while of the 85 idiots 33 per cent. were first pregnancies."

So we can put it --

Mitchell—

whole material	22·8 per cent.
special class (idiots).	33 per cent.

Somewhat similarly, but preferably, as giving a closer comparison, may be expressed Langdon Down's³ data. Of 2,000 idiots he found 24 per cent. first born. Now the average size of the families these idiots came from was 6·91, the total number of children being therefore 13,820 ($6\cdot91 \times 2,000$). Among these 13,820 there were, of course, 2,000 eldest born, one to each family, making a percentage of 14·4.

Hence —

Down—

whole material	..	..	..	14·4 per cent
special class (idiots)	..	..	..	24 per cent.

¹ Brehmer: *Die Aetiologie der chronischen Lungenschwindsucht* (1885). *Die Therapie der chronischen Lungenschwindsucht* (1889). Rissel: *Erblichkeit und Infektiosität der Schwindsucht* (1892). Weitere Pathogenetische Studien (1901) *Schwindsucht und Krebs* (1905).

² Edinburgh Medical Journal. Jan., 1866.
Mental Affections in Childhood. 1887.

Again, the 381 Crossley Sanatorium consumptives of whom I got particulars came from as many families, the members of which numbered in all 2,164. Now in 2,164 people the number of eldest born was 381, or 17·6 per cent. Amongst the 381 consumptives it was 113, or nearly 30 per cent.

And so :—

Pearson and Rivers—

whole material	...	...	...	17·6 per cent.
special class (consumptives)	...	...	...	29·6 per cent.

The method of comparison is now clear, and succeeding figures will be given without comment.

*Heron*¹—

whole material	...	...	...	16·5 per cent.
special class (lunatics)	...	...	...	23 per cent.

In Brehmer's cases—

whole material	...	...	...	14·8 per cent.
special class (consumptives)	...	...	...	18·2 per cent.

In Riffel's records—

whole material, "S. & K."	16·3 per cent.	;	"W. P. S."	
	16·3 per cent.	;	"E. & I."	20·1 per cent.
special class (deaths from phthisis), "S. & K."	20 per cent.	:	"W.P.S."	18 per cent.
		:	"E & I."	17 per cent.

Own Pedigrees—

whole material	...	...	...	15·8 per cent.
special class (consumptives)	...	...	...	20·1 per cent.

Among other findings which can be similarly stated is one kindly sent by Dr. Crzellitzer² :—

Crzellitzer—

whole material	...	...	...	18·9 per cent.
special class (high myopics)	...	...	...	28·6 per cent.

S Hansen's results, published in the EUGENICS REVIEW last October, come out :—

whole material	...	...	...	17 per cent.
special class (consumptives)	...	...	...	28 per cent.

It becomes clear, then, that calculations such as the above have convinced many different people that the fate of the eldest born is to recruit the ranks of certain abnormal classes more often, proportionally, than do succeeding members of a family.

Now, as regards consumptives, from the outset I had suspected a mathematical fallacy. That was why, to begin with, high mathematical opinion was invited. In my examination of Riffel's data, too, I had taken the percentages of deaths from pneumonia, typhus, trauma and cancer, and compared them according to order of birth. Except cancer, they had not shown eldest born incidence. Crzellitzer, in a later paper,³ had done similarly with ocular defect other than hereditary high myopia; he had not found eldest born incidence here either. But the numbers of his "control" were very small; and my figures from Riffel, although larger, were not comparable with those derived from a material of living consumptives. Therefore having begun for another purpose a "control" consisting of normal persons of the working classes, mostly urban dwellers, and of an age distribution similar to that of sanatorium patients, I made order of birth one of the particulars on the schedule. After this

¹ A First Study of the Statistics of Insanity. 1907

² Wie vererben sich Augenleiden? Gesellschaft für Soziale Medizin, Hygiene und Medizinalstatistik. Feb 10, 1910.

³ Die Vererbung von Augenleiden. Berliner klin. Wochenschrift, 1912, No. 44

was begun, Mr. Macaulay sent his pamphlet,¹ in which, considering only the biometric publications, he put down the described elder born incidence to a statistical fallacy connected with the ages of the subjects examined. And seemingly the findings in my control cases support his main contention. They relate to 259 subjects, both men and women,² coming from as many families, the members of which numbered 1,754. The percentages of eldest born are :—

whole material	...	...	...	14·7 per cent.
special class (the actual examinees)	...	...	22	per cent.

Other methods of calculation give a like result, as is shown in the following table :—

			Expected Number.	Actual Number.
Crossley Sanatorium Consumptives—				
1st born ...	..	..	67·1	..
2nd born...	..	..	64·4	79
Normals—				
1st born ...	..	..	38·2	57
2nd born...	..	..	37·3	..

The normals go on to show a large third born excess, which the consumptives do not; but both agree in a practical equality of actual and expected numbers in the case of the fourth born, and after that a counter-balancing deficiency for all born later than fourth; precisely the phenomenon invoked to prove not only a special incidence, according to order of birth, of consumption, but also of lunacy and of criminality; indeed a general pathological tendency connected with primogeniture.

These results in normal subjects require confirmation; but it must be remembered that statistical work, as that high authority Professor Pearson and others are always stating, is notoriously full of pitfalls. There was *a priori* likelihood that the eldest born would turn out consumptives and lunatics. We know from obstetricians that the eldest born child is shorter and lighter than succeeding children. Primiparae must be of immature age oftener than multiparae, and Korosi and Marro have described an unhappy fate for the scions of immature stock. My own experience in pig-breeding confirms that of others, namely that first litters are decidedly unsatisfactory compared with later ones. The child of a primipara is more subject to head injury during labour. Wallach and Fruhinsholz³ found that 16 out of 30 premature children brought to a Bicêtre clinic for nervous affections and other defects were eldest born. The well known tuberculous tendency of the insane would be well explained if being elder born were a part of the diatheses of both phthisis and lunacy. Similarly, too, the hardly less certain "variational diathesis" of men of genius; while all four classes, mentally unsound, men of genius, criminals, and consumptives, are just the ones which had been tentatively associated aforesaid. Nevertheless, all such *a priori* arguments must, of course, yield to direct evidence, if that stand examination.

In conclusion, assuming that this excess of elder born in interrogated persons is, as we say, an artefact, to what can it be due? The question must be one for statisticians and mathematicians. Mr. Macaulay appears to think that the elder born will naturally be more often of the age at which phthisis appears than will the younger born. However, the average age of the normal examinees mentioned above hardly varies at all with order of birth. Another explanation is that first advanced by Von den Velden,⁴ who took the tuberculous families in two of Riffel's publications,

¹ *The Supposed Inferiority of First and Second Born Members of Families*. Montreal.

² In the *Lancet* article I have shown, what Crzellitzer for his part confirms, that elder born incidence has nothing much to do with sex.

³ *Annales de Gynécologie et d'Obstétrique*. November, 1911.

⁴ *Archiv für Rassen-und Gesellschafts-Biologie*. Juli-August, 1908.

and made out that while in them there were certainly more deaths from consumption amongst the three earlier born than in the remainder, yet this was due to smaller infantile mortality amongst these earlier born. In other words, proportionally more first, second, and third born infants would survive to grow up to adolescent and adult ages, the time at which phthisis shows itself; and so both the general adult population and the consumptive population are made up to a disproportionate degree of first, second, and third born. The criticism I have to make upon this does not now, after examining normals, differ much from what was said in the *Lancet* article before. These normals do indeed show (what, by the way, the whole of Riffel's data did not) a lessened infantile mortality amongst first, second, and third born children, just those which are present in apparent excess. But that lessened mortality seems too small to account wholly for that excess; and may itself be apparent only.

What would be instructive would be the histories of *completed* families, all of whose members had died; it may be because Riffel's records consisted partly of *completed* family histories, that they showed smaller eldest born incidence than other sources.

However, these are matters for statisticians rather than for clinicians. All that is here urged is that the evidence upon which an association of abnormality with primogeniture has been based, is open to cavil.

W. C. RIVERS, M.R.C.S., D.P.H.

NOTE.—Since writing the above, Mr. Cobb's article in the *EUGENICS REVIEW* for January, 1914, has come to my notice. In this he suggests a leash of fallacies to account for elder born incidence in consumptives, etc. Two of these, being of purely mathematical bearing, I am incompetent to discuss; but the third is inaccuracy of the data, particularly from a younger "sibling" forgetting a deceased elder one, and therefore wrongly reckoning himself or herself eldest born; and concerning this it might be said that it would not apply to many of the cases in the material mentioned above as "Own Pedigrees," since in them the parents of the subject were often questioned. Neither could it apply to the special class of idiots, for here by the nature of the case the subjects themselves could not have been the informants (see Mitchell's data, Down's data, and a more recent and unmentioned paper by Dr. Hunter). Good judges inform me that Mr. Cobb's mathematical attack upon elder born incidence seems so far the best directed one. That matter statisticians will no doubt soon decide. But if it be confirmed that the phenomenon obtains also in the case of normals, then the matter loses interest for clinicians and eugenists—except as a warning against "uncompleted" families.

REVIEWS OF RECENT BOOKS.

Roper, A. G. *Ancient Eugenics: The Arnold Prize Essay for 1913.* Oxford. B. H. Blackwell; 1913; price 2s. 6d.; pp. 76.

It always deserves to be recorded with gratitude when the University of Oxford takes note of any modern problems, and for this reason alone Mr. Roper's book would deserve a welcome, even if it should turn out that he has been able to add little of moment to the chapter on ancient eugenics in Dr. E. H. J. Schuster's excellent little book on "Eugenics." For if the results of researches into ancient eugenics prove to be mainly negative, the modern eugenist can at least start afresh on scientific lines, unhampered by any overwhelming weight of tradition, after a respectful salute to Plato's prophetic soul. Now, if Mr. Roper can be trusted, such actually proves to be the case. He has constantly to claim eugenical significance for institutions whose origin was probably very remote from conscious eugenics and for opinions into which he reads far more than they probably meant, and to eke out the scantiness of the historical material by frequent philosophizing, which suggests that he is a philosopher rather than a historian. But the truth is that the historical evidence is hopelessly inadequate, and that Mr. Roper has been set the task of making bricks out of straws. He naturally makes the most of the Spartan practices of exposing sickly and deformed, and not looking too closely into the parentage of healthy, children, etc. But he does not attempt to prove that these practices were consciously eugenic in their intention or the real reason of the superior physique of the Spartan ruling class, and it is far more probable that they were relics of barbarism, like the rest of the institutions of the rude invading warriors who impressed the Greek imagination so far above their deserts. If so, they should, like the killing of the aged and diseased in many savage tribes, be conceived as incidents rather of natural selection than of eugenics. Nor does it appear that biologically the system was a success. Whether from excessive warfare or from excessive in-breeding, or from economic reasons, or from other causes we can hardly guess at, the Spartiate population never became adequate to secure the position which Spartan bravery had won. So far from increasing under the (alleged) eugenical solicitude of the State, it progressively diminished from a (traditional) 10,000 to less than a thousand, and this although in practice the elimination even of the physically unfit does not appear to have been at all rigorous. Mr. Roper should have remembered the case of Agesilaus, whose congenital lameness did not prevent either his survival or even his succession to the kingship in preference to Leotychides, whose legitimacy was disputed. And this in spite of an oracle warning the Spartans against a "lame" reign. If the story be held to prove at any rate the existence of a prejudice against a physical defect in a ruler, like the objections of the Cyrenaens to a lame Battiad and of the Bacchiads to marrying Labda, which are recorded by Herodotus (whom curiously enough Mr. Roper nowhere cites), it shows at any rate that such defects were not necessarily fatal to the individuals afflicted with them.

Far more important for the student of eugenics than the crudities of Sparta would be a knowledge of the social and biological conditions that attended the two great ages of Hellenic colonization, before the sixth century B.C., and after Alexander's conquest of the East. For these represent the biological *floruit* of the Greek stock. Unfortunately, however, history is almost completely silent on these eras, or at any rate does not enable us to understand how the result was achieved. In the case of the earlier period of colonization, we know only the cities which founded the colonies, but it is clear that they by no means always provided the mass of the colonists. In the case of the later period his-

torians have been completely absorbed in the struggles of kings and left us to rely on fragmentary archæological material for glimpses of the human flood of settlers that hellenized the East in the wake of Alexander's army. Under the circumstances it is no wonder that the scientific study of the eugenics of a single tribe of modern savages, like the Masai or the Zulus, should promise more enlightenment than the whole of ancient history. Such is the imperfection of the historic record.

The one great figure in ancient eugenics is really Plato, who alone can be said to have perceived the spiritual significance and potentialities of the crude methods of social selection which were practised in the Greek world. But Mr. Roper does not bring out his unique position. He succumbs instead to the Oxford convention that it is *de rigueur* to make out that Aristotle has said the last word on every subject of human interest, and even commits himself to the astounding statement that "the *Politics* not only set the final seal upon political science in Greece, it also marks the last word in eugenics" (p. 69). Even if we charitably supply what Mr. Roper may perhaps have meant, viz., "ancient" before "eugenics," the remark is not far short of absurd. For Aristotle shows no sign anywhere of appreciating the suggestiveness of the great work of the creative imagination which we know as the *Republic* of Plato. His own suggestions about infanticide, abortion, slavery, the rearing and education of children, etc., do not rise above the common-places any self-satisfied conservative professor might cull from the practice of the period. The fixing of the age of marriage at 37 for all men and at 18 for all women would appear to be a delicious auto-biographical universalization of his own marriage to Pythias, but it seems ludicrous to dignify his prejudiced platitudes with the title of a scheme of eugenics, and to ascribe its limitations to scientific caution, rather than to lack of imagination.

Mr. Roper's account of Plato's speculations also is open to exception in some respects. He ascribes to Plato's Utopia the extraordinary institution that in it all the offspring of the working classes were to be systematically put to death, and naturally infers that these classes would soon "have suffered total extinction" (p. 44). Plato has absurdities enough to answer for—such as the first step towards the realization of his ideal, viz., the total expulsion of all the adults from the future ideal city by order of a tyrant converted to philosophy—but this insanity has been manufactured for him by Mr. Roper, who has not observed that the passage in 460 C, to which apparently he refers, is not concerned with the births in the lower classes at all, but with the problem of inferior offspring in the "guardian" class. He evidently has not grasped that Plato's proposals for communism, abolition of the family and eugenics, were all intended to apply only to the upper classes, as Aristotle's censure of these proposals in the *Politics*, 1262 B confirms. Altogether it cannot be said that Mr. Roper has exhausted his subject.

F. C. S. SCHILLER.

Douglas, A. R. *Some Suggestions Respecting the Care of the Feeble-Minded under the Mental Deficiency Bill, 1913*. London. Adlard; 1913; pp. 6. (Reprinted from the *Journal of Mental Science*, July, 1913.)

THE Bill to which this article refers became an Act shortly after it was written, but what is said of the Bill is equally applicable to the Act, as such changes as were made in the later stages were not of a fundamental character, nor do they for the most part affect the arguments here presented.

The article sets out the views of the writer as to the general lines on which the provision of institutional care under the Act can but be organised and co-ordinated in the widest and most general aspect of the matter.

As the medical superintendent of one of the most important existing voluntary institutions for defectives, he is particularly well qualified to form an opinion, and the views he has put forward deserve and are doubtless receiving attentive consideration.

He recounts the various types of institutions in which defectives are found at the present time with short comments, but omits to include in his list the institutions of the Metropolitan Asylums Board, which give London the distinction of having dealt more effectively with this problem than any other area in the country. He does, however, make special mention later in the article of the excellent work being done at the Darent Industrial Colony under Dr Rotherham, who has since been appointed a member of the Board of Control.

He also omits any special reference to the voluntary colonies at Sandlebridge and Hildenborough.

As regard special schools he holds that they fail in the all important particular of proper control when the child is not actually in school, a view with which one cannot but agree.

He lays great stress on the importance of classification in order to secure good results and looks to the definitions of the Act to help us in this direction. It must be observed that in their final form the definitions tend to raise the dividing line between the imbecile on the one hand and the feeble-minded on the other in such a way as to leave only the very highest grade of defectives in the latter class and to make the distinction between them rather shadowy.

It may be well to recall that by these definitions the imbecile is one who is "incapable of managing himself or his affairs," while the feeble-minded is one who 'needs care, supervision, and control for his own protection or the protection of others.'

This approximation of the definition of the two groups happens to accord with the view of Dr Douglas, that the "idiot" group should be separated from the others, and that the members of the feeble-minded and imbecile classes could with advantage be grouped together in either a separate department or a separate institution, at all events under the age of 16. Unfortunately the tendency in the past under the influence of legislation has been for the most part to group the idiots and the imbeciles together, but apart from this there is much to be said for Dr Douglas' view, and it is well known that the voluntary institutions under the Idiots Act have included many feeble-minded cases in their numbers, indeed, it was intended that they should be so included when the Act was passed in 1886.

He thinks it would be necessary to provide hospital accommodation with a fully trained nursing staff for 20 per cent of the cases coming within the class of "idiots." This seems a very high estimate, and would undoubtedly be costly, but it cannot be denied that this class of case requires a large amount of individual attention.

Highly trained, certificated teachers are, as Dr Douglas says, not necessary for the imbecile class, nor are the members of this class liable to a great amount of sickness.

He suggests that the most convenient way of handling the question would be to form "associated areas" by combinations of counties, to provide the necessary institutions, which should be assisted by and linked up with the five voluntary institutions already in existence.

He points to their experience of forty years, their complete equipment and resources, and their convenient geographical position for such a purpose, which would, he thinks, save the county authorities unnecessary expense. He suggests that their staffs should be drawn on for manning institutions hereafter to be built, that they should be used for the training of teachers and attendants, and also as a central institution or filtering

ground for each associated area in which all defectives should spend some six to twelve months before being drafted to the other homes or colonies, in accordance with the opinion formed as to their aptitude.

In regard to this scheme, there is a good deal to be said against putting the lowest grades of defectives into entirely separate institutions from the middle and higher grades; in the first place, the work becomes extremely monotonous and depressing for those who are entirely confined to the lowest grades of case, and there is not the same opportunity for utilising the work of the more capable defectives in regard to the domestic requirements of the very helpless. Moreover, too much specialisation leads to a narrow outlook on the part of those in control and makes for a stereotyped rather than an elastic classification in which ready interchange should be possible; for these reasons there is much to be said in favour of separate departments rather than separate institutions for the different grades.

So far as one can gather, it is proposed to retain all classes of defective for from six to twelve months in the central filtering institutions; this seems rather a long probation if the objections to this system are as great as is suggested; it would also probably lead to an undue choking of the filter.

Dr. Douglas is of opinion that industrial colonies are more likely to provide what is wanted, and to be economically successful than farm colonies. No doubt Darenth forms an excellent example of the former, and one cannot at present point to a similarly successful example of the latter type at present in this country but it is rather early to judge; certain forms of farming may be made very remunerative, but it will probably be necessary to select carefully the cases for this work, as obviously the difficulties of supervision and control are greater.

R. LANGDON-DOWN.

Wormald, J. and S. A Guide to the Mental Deficiency Act, 1913. London. P. S. King and Son; 1913; price 5s. net; pp. 145. As Mr. Edmund Harvey, M.P., says in the preface to this book, the authors have special qualifications for their task. Mr. John Wormald, besides being a lawyer, has been for many years Chairman of Industrial Schools and the Special Schools, Boarding-out and Care Committees for the Mentally Defective in Leeds, and there is ample evidence in the work of intimate and practical acquaintance with many aspects of the problem of the mentally defective.

After an introduction there are sections dealing in turn with (1) the operation of the Act, (2) the authorities under the Act, (3) the administration of the Act, (4) offences against the mentally defective, (5) finance and statistics, (6) conclusions.

This part of the book, which occupies 95 pages, is followed by the Act itself in an appendix and an index to the first part of the work.

The authors have not confined themselves to a bare legal commentary on or explanation of the Act; they have dealt with this, but have also made many useful suggestions as to how the measure may be put to the best use with appropriate references to the Report of the Royal Commission, and to work that has already been done in this field both here and abroad.

There are some matters of opinion on which one might be disposed to take a different attitude from that of the authors, particularly in regard to the question of boarding-out for these cases, but as a rule the views expressed are in accord with practical experience.

In regard to the history of the recent movement for legislation, the authors have fallen into some confusion. The first Bill to come before Parliament was the Feeble-Minded Persons Control Bill of Mr. Gresham Stewart on behalf of the Eugenics Education Society and the National Association for the Care of the Feeble-Minded. This Bill was read a second time without a division, which was a surprising result indicating

an unexpected readiness on the part of Parliament to deal with the question.

The essential feature of that Bill was that it endeavoured to set out the absolute minimum requirements with the least possible interference with existing machinery, and it had the great merit of leading to the prompt production of the Government Bill. The little Bill was framed on these lines in order to rouse attention and because it was hopeless for any private measure on any broad lines to have gone very far.

It is only fair to say that there are some independent authorities who still think it would have formed the basis of a very useful Act.

It seems altogether premature to speak of the defects of lunacy administration in a new and distinctive branch of work, and many well acquainted with lunacy administration are by no means so lacking in confidence in it as the authors appear to be.

The Mental Defect Bill introduced by Mr. Hills on behalf of the Charity Organisation Society's Committee was never read a second time and was too big a measure for either the Government or a Private Bill.

These remarks on this historical point seem called for here owing to the active share taken by the Eugenics Education Society in this matter, and it would be a pity to allow the mistake to pass unnoticed.

The book is very readable and interesting. One may express the hope that the authors will take the earliest opportunity of removing the last syllable of the word "stigmatum" on page 94. In general the work is one which should be extremely useful to members of local authorities at the present moment and to all interested or engaged in the matter.

R. LANGDON-DOWN.

Montessori, MARIA. *Pedagogical Anthropology.* Translation by F. T. Cooper. London, Heinemann; 1913; price 14s; pp. xiv., 506. THIS is not an easy book to review. Considered from the standpoint of biology, of physiology, and of anthropometry, it contains a considerable amount of information. There are chapters on mendelism, craniology, pigmentation, statistical methods, biographic charts, and other similar topics. The matter is compiled from the works of Broca, Quétélé, Sergi, Lombroso, and numerous Italian anthropologists. No claim is made that it embodies more than a modicum of original research, and the above-mentioned chapters contain no more and no less than is to be found on these topics in current handbooks. Still the compilation is a useful one as bringing together into one volume a good deal of heterogeneous matter, although the presentation is so uncritical as to make some of it dangerous reading for the novice.

It is evident, however, that to write a mere compilation of anthropometric methods was not Dr Montessori's chief aim. As readers of her previous work on education will realise, she takes herself very seriously as an educator, and in this book is at pains to show how a knowledge of all the facts that anthropometry can give about the young child are of value to those responsible for his education. Here the book fails, because, though it is evident that all knowledge about the physical development of our pupils is to the good, Dr. Montessori does not bring out in detail what its precise value is, or what may be expected from it in the near future. It is true that she points out, and the statement is suggestive, that cerebral exercise develops the brain, that while blind children and deaf mutes up to the age of seven or eight have normal craniums, by the age of fourteen or fifteen the volume is subnormal, and that this inferiority remains; thus showing the effect of education on brain development. But when she proceeds to discuss the difference between the cranial measurements of clever and of stupid children and to ask "In school can we be sure that the child whom we judge the most intelligent is really so?" (p. 252) it is clear that she is wholly ignorant of a great deal of contemporary work and thought that bears on her question. She says "We

have not yet learned the ways of judging intelligence." Possibly we have not; but the observations of Spearman, Burt, Meumann, Muensterberg, and numerous other people whose papers have for years been appearing in the German, English, and American journals of psychology and education have got much further in this direction than has Dr. Montessori, and had she the slightest acquaintance with this literature she could scarcely have avoided making some reference to it.

We have the same feeling of disappointment when we read the chapter on Mendelism and heredity. A brief but lucid description of Mendel's positions is given, but no reference whatever is made to the fact which in respect of heredity is of paramount interest to the educator, namely, that as the results of education are largely acquired characteristics, it seems at first sight reasonable to assume that they will not directly affect posterity. Indeed, modern biologists almost without exception are at pains to maintain that "education cannot affect the development of the race." The statement is one that the educationist cannot possibly accept. There are arguments by which it can be invalidated, and to make these good must be the first business of writers on education who deal with heredity. But from Dr. Montessori we get nothing but the unproven statement, "popular education means the betterment of the race" (p. 245).

It is regrettable that Dr. Montessori, both here and in her other publications, should show herself ignorant of what is being done and thought in matters of education outside Italy, since the condition of schools and scholars in that country is notoriously bad. The book in question resembles some of the works on "educational psychology" which were current as recently as ten years ago, in which to a summary of current psychological doctrine was tacked on some aphorisms about the education of the young. So, too, Dr. Montessori sprinkles her statements about anthropometry with remarks and aspirations which always are flowery and sometimes are nonsense. A few examples must suffice—

"In this way (*i.e.*, by collecting anthropometrical data) we may rise from the arid and fatiguing gathering of analytical data towards conceptions of noble grandeur, toward a *positive philosophy* of life, and unveil certain secrets of existence that will teach us the moral norms of life" (p. 27).

"The teacher prepares for greater utilisation the physiological and intellectual forces of the new man, like a Greek deity scattering broadcast his prolific riches. But above all he prepares the souls for the sublime sentiment which awaits the humanity of the future, glorying in the attainment of peace, and then indeed he becomes almost a redeemer of mankind" (p. 360).

"The germinal potentialities that contain beauty and strength seem predestined to that predominance which will achieve the triumph of life in the individual. To learn the laws of the union in one individual and definitive unity of the infinite dominant and recessive potentialities that must encounter one another in the mysterious labyrinth in which life is prepared—therein lies the greatest problem of the present day. It is that which should constitute our guiding purpose" (p. 67).

Educational theory is slowly emerging from the phase in which phraseology of this kind was considered to help matters forward. It is to be regretted that Dr. Montessori, who seems to have caught the ear of a certain section of the public, should not realise that high-sounding phrases are not argument, and will discredit whatever element of good her work may contain.

M W KEATINGE.

Hartley, C GASQUOINE (Mrs. Walter H. Gallichan) *The Truth about Women*. London. Eveleigh Nash; 1913; price 7s. 6d.; pp. 396. THE title of this book has not been well chosen; in the first place it suggests a dogmatic tone that is not to be found in the book; in the second place it is the kind of title that might attract the reader with

pornographic tastes and repel those who are in search of serious discussion of the sex problem. There are few things more to be desired at the present day than an unbiased treatise concerning the characters of and relations between the sexes. Such a book would require wide knowledge and an impartial scientific treatment. The work before us sets out to accomplish this task, and we are glad to emphasise the obvious fairness of mind and desire for truth which is shown throughout the book. But successfully to accomplish this task demands a more thorough acquaintance with the vast field of knowledge over which the subject ranges, and in particular a greater power of orderly and logical arrangement of matter and argument than are at the disposal of the author.

The first chapter states that the chief problem is to discover what are the exact differences between the sexes and what share we should respectively attribute to inheritance and environment in producing those differences. The rest of the book is divided into three sections, of which the first is biological, the second historical, whilst the third deals with present-day questions. Many of the problems relating to the origin of sex among primitive organisms and similar matters are somewhat out of place in a work of this kind, and are not of any help in our search after a solution of the sex problem of to-day. The historical section is more valuable. In our opinion, however, the author lays too much stress upon the tracing of descent through the mother as a proof of the exalted position of women at an early period. An important study of all the literature concerning the Australians has recently been published by Malinowski, he shows that the most trustworthy evidence represents the Australian women as occupying a very inferior position and leading laborious lives as compared with the men. The third section deals with modern problems such as labour, divorce, and prostitution. The author's views are sane and interesting, with regard to modern tendencies as a whole she is decidedly optimistic.

One feature of the book cannot be passed over in silence. The carelessness of the proof reading is almost incredible. A long list of "errata" has only corrected a small fraction of the mistakes. Let us confine our examples to proper names that are spelt rightly in one place and wrongly in another. We have Espinas and Epinas, Howitt and Howit, Haddon and Haddow, Hatshepsut and Hit-hep-sut, Schoolcraft and Schoolcroft. Weininger has two variations, Weinnger and Wienninger, whilst most absurdly of all, de Vries is spelt de Veres, which is corrected in the "errata" list to de Vries.

V. M. CARR-SAUNDERS

Dibdin, Sir Lewis, B.C.L., Chadwyck Healey, Sir Charles F.H., K.C.B., K.C. *English Church Law and Divorce*. Part I. Notes on the *Reformatio Legum Ecclesiastiarum*, by Sir Lewis Dibdin, D.C.L., Dean of the Arches. Part II. Notes on the Divorce and Re-marriage of Sir John Stawell, by Sir Charles E.H. Chadwyck Healey K.C.B., K.C., Chancellor of the Diocese of Exeter. With appendices. London: John Murray, 1912, price 5s, pp. 180.

IT is reasonable to assume that if Sir Lewis Dibdin, K.C., had the conduct of a contraversial matter in the High Court, and desired to procure a judgment or get a verdict, he would open all the facts of his case so that the judge would understand them, he would then present his evidence and his points of law, and close with an argument to prove that his contention was right. Such a procedure in the arrangement of a book upon so controversial a subject as the "English Church and Divorce," would appear to present no difficulty. Unfortunately the learned authors, who are both eminent lawyers, have not seen fit to follow it. The first part of the book is written by Sir Lewis Dibdin. More than one-fourth of it is devoted to the history of the *Reformatio Legum*, and barely two pages to its relation to divorce. The rest of this part of the book is mainly

taken up with a collection of the expressions of sixteenth century divines as to divorce, and other material which tends to show the divergence between the law and practice of the Church of England in that period of its history, and the opinions of its individual members

Sir Charles Chadwyck Healey's contribution to the "English Church and Divorce" is a review of the history of Sir John Stawell who, after having divorced his wife in 1556, re-married by a licence from Archbishop Parker. Sir Charles is able to prove that though formally drawn, sealed and issued, the licence was never entered upon the records of the Faculty Office, and that the Archbishop apparently refused at a subsequent date to recognise the marriage.

Frankly, the book is neither a treatise on nor an exposition of Church history in its relation to divorce. If Sir Lewis Dibdin's object in publishing it is to refute the allegation that divorce *a vinculo* had been granted by the English Church Courts during the period which followed the *Reformatio Legum*, and that those courts purported to derive their authority from that document, he has perhaps succeeded in his purpose. But every student of Church history knows that the *Reformatio Legum* was never incorporated into any kind of law in England, and that it is merely an historical document of no greater value than as representing the views which certain ultra Protestants, of German and Swiss origin, more or less successfully tried to impose upon unwilling English Churchmen, during the period of the Reformation.

As notes upon the history of the measures that were taken in the reign of Henry VIII., and Edward VI. and Elizabeth, to produce this scheme and to give it the authority of statutory law, Sir Lewis' work is interesting, and, to a certain extent, of value, particularly as it is amplified by some original researches by the Rev Claude Jenkins, the Lambeth librarian. Nevertheless, the fact remains that the title of the work is a misnomer. If only the authors could have addressed themselves to the task of telling us what the English Church law with respect to divorce really is, and have explained how the present apparent perversion of it came to be adopted, they would have made a valuable contribution to a discussion which is painfully agitating the minds of many earnest Churchmen at the present time.

For all that this book contains, the English Church might be thought to have begun its existence with the Reformation. There is no reference to the history of the Church in these islands before Rome obtained her world-wide supremacy. What English Churchmen are eager to know is—what was the doctrine of the early fathers of the English Church respecting divorce? What was the rule of the Church up to the fourth century? What was the practice of the Church before the Popes obtained their authority? How did the Great Head of the Church regard marriage and divorce? We know, of course, what interpretations the authorities of the Middle Ages place upon His teaching, but is that interpretation right? These are burning questions. There are thousands of zealous Churchmen who are divided in their minds between loyalty to the Church's teaching and a growing conviction that the good of society and the moral and physical health of their fellow beings demand a change in the present legal conditions. The admonition of an ignorant Pope silenced Galileo for a time. The theologians of the Holy Office who surrounded Paul V. were able to satisfy the Church of their day that the proposition that the world revolved around a fixed sun was "absurd in philosophy" and "expressly contrary to Holy Scriptures." We now know that the Church was wrong and that Galileo was right. Is it not at least thinkable that the Church may be wrong in its present interpretation of Holy Scripture with respect to marriage and divorce?

When did the theory that marriage is indissoluble first become a dogma of the Church? St. Paul allowed divorce where one party did not choose to live with the other, owing to religious differences. Justin Martyr,

in an address to the Roman Senate, commanded a Christian wife who, taking advantage of the Roman law, divorced her husband because of his debaucheries so that she might not partake of his crimes by living with him. St. Epiphanius allowed divorce, and said that if either party married again the Church absolved them from all blame, tolerated their weaknesses, and did not reject them either from the Church or eternal life.

The theory of the indissolubility of marriage did not apparently find favour in the Church until after the Fourth Century, and here in England, after the Sixth Century, Theodore, Archbishop of Canterbury, in a Penitential, declared marriages to be dissoluble on the grounds of desertion, adultery, impotence, relationship and captivity.

Is there not ground for the assumption that the ecclesiastics, at a time when their conduct caused the Church the greatest humiliation, were more influenced by cupidity than religious zeal in enforcing the doctrine that marriage was indissoluble? They assumed sole control over the marital relations. They granted, for pecuniary consideration, permission to marry, and when those whom they had joined together desired to have their marriages dissolved, they found, also for a pecuniary consideration, specious excuses for separating and then remarrying the parties, while still insisting that the sacred tie was indissoluble. Mr. Lee, in the Cambridge Modern History, says "the most holy sacrament of marriage, owing to remote consanguinity coming within the prohibited degree, was made a subject of derision to the laity by the venality with which marriages were made and unmade to fill the pouches of the episcopal officials." He might have instanced the case of Bothwell who, when he wanted to divorce his wife in order that he might marry Mary, got a decree on the ground that one of his ancestors had married into his wife's family a century before. As Cardinal Borgia, the Vice-Chancellor of Innocent III, wittily, if profanely, said, "God desireth not the death of a sinner, but rather that he should live and -pay."

If Sir Lewis Dibdin, or some other lawyer equally well grounded in Church history, might divest himself of all prejudices in favour of present received theories, and with a mind trained to weigh evidence, should set himself to write a history of English Church law and divorce, the result of his labours would be gladly welcomed R. NEWTON CRANE.

Andrews, C. B. *Life, Emotion, and Intellect* London and Leipzig.

T. Fisher Unwin, 1913; price 5s net; pp. 95.

THE author makes use of the following passage as a kind of motto to his book: "Life is real, intellect is artificial; emotion, although it is obliged to express itself in intellectual formulæ, is our nearest approach to the essence of life." His persuasion of the artificiality of the intellect appears to lead him into statements with which Eugenists must quarrel. We attempt, he says, to destroy love by Eugenic marriage certificates. If love is blind then the believer in the Eugenic health certificate for marriage is blinder still—and so on. Galton long ago gave a complete answer to statements of this sort. Society has erected all kinds of barriers, economic and customary, within which the emotional activities of the individual are confined, the Eugenist regarding many of these as purely artificial wishes to substitute rather better ones, resting more on a biological than on an economic and social basis. We join the author in deplored any attempt to standardise humanity. Eugenics aims at the preservation and preponderating survival of the best of all classes. On the whole the book is a not uninteresting essay on the emotions, with special reference to the emotional reticence of Englishmen. C. S. STOCK.

Delzous, LOUIS. *La Famille Française et son Evolution.* Librairie

Armaud Colin; price 3 fr. 50 c.; pp. 287.

THIS book is an interesting study, by a French lawyer, of the forces at work in France during the nineteenth century which transformed the

family life of the pre-Revolution period into the family life of to-day. For a long period after the establishment of the Napoleonic code, the middle-class, organized into a compact network of officialdom, preserved a high standard of rectitude, and maintained the traditions of rigid parental authority. Circumstances, however, occurred which discredited official rank to some extent, and an aristocracy of wealth arose in its place, with a consequent lowering of moral standard. Divorce was re-introduced, and family life deteriorated.

The Napoleonic code, which made an equal division of property compulsory, gradually tended to reduce the size of families, and the practice of neo-Malthusianism spread throughout the ranks.

Parental authority decreased as the place of the child in the family rose in importance. The former spartan methods of training now made way for a highly specialized and scientific system of rearing, which, though excellent in many respects, rather tended to develop the mental and physical side of the child at the expense of the moral.

In the industrial world, the woman wage-earner became a new factor to be reckoned with, and the bad effects of married women's work upon the husband, home, and children are traced in a very forcible and convincing manner.

It is impossible in a short notice to give a fair idea of the scope of this work. As an illuminating exposition of the laws of cause and effect it may be recommended to all those interested in modern solutions of social problems.

EDITH CORRY.

Leopold, LEWIS *Prestige: A Psychological Study of Social Estimates.*

London T Fisher Unwin, 1913, price 10s 6d, pp 352

THIS is a curious and unsatisfactory book, partly on account of the nature of the subject and partly on account of the style, which is often obscure and involved. The sentence summing up the outlines of the argument is an example of difficult and uneasy English "We shall endeavour to prove the recipient of prestige, then its possessor, and finally we shall strive, in the psychological situation of both, to find that peculiar constantly recurring essential point which—setting aside all coincidences—characterises prestige" (page 46). Again, the constant and unnecessary use of italics is confusing to the eye and mind "For instance, the prestige spell of long past times that have become *up to date*, of exiles who are *expected home* but *live at a distance*, or of the Papacy, which is *surrounded* by religious sentiment but *shut off* from the world in the Vatican, are *classical instances*" (page 109). Even in its context, such a sentence, also in italics, as "*Prestige of intellectual career paralyses a good many possibilities of proletarian self-consciousness*" (page 230) is difficult of apprehension by the ordinary man.

But apart from obscurities of style, prestige seems to be one of those intangible creations of the human race which defy analysis, and even 350 pages of careful study, full of suggestive examples culled from history and anthropology, do not bring us much nearer to a real understanding of the nature of prestige. Readers interested in the dark places of human psychology and in the irrational values attached to different actions and characteristics at different periods of time will find much to stimulate their curiosity, but we put down the book with the feeling that prestige has been successful in defying the efforts which would reduce it to an affair of paper and ink and give concrete expression to its indefinable psychological effects.

C D W

Parkinson, RIGHT REV MONSIGNOR HENRY, D.D., Ph.D. *A Primer of Social Science* London P S King and Son, 1913, price 2s, pp 276

THIS little book was written at the suggestion of members of the Catholic Social Guild. "It is intended for beginners, and aims at pre-

senting social science with some completeness of outline and under the light of Catholic principles." As an outline the work is admirably comprehensive and clear, and it deserves a wide circulation among beginners who find it hard to co-ordinate their ideas of society. Monsignor Parkinson deals first with the elements of social life, such as the individual, the family, the State and the Church. He then explains production, distribution and consumption under the general heading of Economic Relations. Lastly, he discusses poverty and its remedies. As a reformer, his attitude is practically that of modern conservatism, although he calls himself a Catholic social reformer, and is more advanced than "the Conservative School." Throughout the book Christian principles are appropriately stated, but they never get mixed up with economics or political science.

The Papal encyclical "On the condition of the working classes" ("Rerum Novarum") is frequently quoted as giving the authoritative view of the Roman Church upon modern problems of life and labour, and at the end of each chapter a short bibliography of religious and secular works is given. Where all is good, it is hard to select passages for praise, but the economic explanation of the injury done to society by *extravagance* in all classes is especially excellent and more valuable than many sermons. Our only regret is that in a work dealing with fundamentals, the author has made no reference to the action of heredity in society or to the importance of the eugenic point of view.

A. W. COCKBURN.

McCabe, J. *The Principles of Evolution* London and Glasgow. Collins' Clear Type Press, price 1s. net; pp. 264

THIS is one of the series of small shilling books issued under the title of "The Nation's Library." It gives a clear and easily comprehensible account of the main facts on which the theory of evolution rests, and of the less certain theories of the means by which it has been brought about. The earlier chapters may be recommended to the novice who has not made any previous study of the subject. It is somewhat doubtful, however, whether there is room for another small book of the kind when more than one good account is available at no greater price, and in the later chapters the author is frequently irritating and sometimes misleading. Large parts of the book are obviously written at second hand, and the dogmatic attitude adopted towards unsolved questions is regrettable. The account of Mendelism is almost ludicrously inadequate, and clearly indicates that the author has read little on the subject and has not grasped the essence of what he has read. The sentence "The fluctuations are said to be due to environmental influence, and to be transmissible, the mutations are due to changes in the determinants and are not transmissible" shows inexcusable carelessness in writing or proof-reading. The author's philosophical attitude is exemplified by the sentence, "Idealism is the most singular and the most hollow delusion that ever entered the human mind."

L. DONCASTER.

OFFICIAL PUBLICATIONS.

THE ENGLISH CONVICT : A STATISTICAL STUDY BY CHARLES GORING, M.D.,
B.Sc. Lond., *Deputy Medical Officer, H.M. Prison, Parkhurst.*
pp. 440; 49 fig.; 285 tables; index.

This masterly report contains a minute statistical analysis of the criminal. The layman must not allow its publication by the Government or its scientific treatment to deter him from studying it. Although by the very nature of the work there is much in the way of figures and tables and calculations that the ordinary man will not follow with ease, yet the main body contains a mass of information and suggestive fact that from its lucid presentation will absorb the attention of the philanthropist, the social reformer, or of that large section interested in human nature, while it will prove of especial importance to the eugenist. The breaking up of the chapters into sections and an index makes its assimilation much simpler.

The original idea was a statistical enquiry into the truth of the theory of a criminal type, and of the view of Lombroso's school of thought, that the physique of the criminal predestined him to a life of crime. But when the enormous mass of material came to hand, it was felt that this could be profitably extended to a much fuller enquiry. The material lay in those who were sentenced to the prisons at Dartmoor, Parkhurst, Borstal and Portland after 1st June, 1902, until the number of 3,000 had been reached. The statistical reduction of the data was carried out at the Biometric Laboratory of the University of London.

The report opens with an introduction dealing first with the superstitions of criminality, in which Lombroso's theories are dealt with at some length, pointing out the unreliable and unscientific data admitted by him; secondly, discussing the objects and means of the enquiry. Only by a statistical method can a scientific basis be laid. The real question to be discussed is whether the criminal is a morbid abnormality differing qualitatively in his physical and mental make up from the ordinary man, or whether he has certain qualities shared by all, in a larger or lesser degree.

Part I. inquires into the alleged existence of a physical criminal type. There is a brief explanation on the statistical methods employed. After an examination dealing with 37 physical characteristics such as head lengths, cephalic index, chin projection, eyesight, shape of the nose, asymmetry of the face, of criminals divided up according to the nature of their crimes—malicious damage to property, stealing and burglary, sexual offences, and so forth. Dr. Goring concludes that "if there is any real association between physical character and crime, this is so microscopic in amount as not to be revealed. . . ." He compares the criminals not only with each other, but also with Oxford and Cambridge undergraduates and others. "No evidence has emerged confirming the existence of a criminal type such as Lombroso and his disciple have described."

Part II., chapter I., deals with the physique of the criminal. He is found to have a lesser stature and strength and diminished weight. Although those convicted of violence to the person have an average degree of strength and constitutional soundness considerably above not only the criminal but also the general public. But the facts do not allow of further deduction. The age incidence of the first crime centres round three points, the most important one being 20-25, then a more protracted and less emphatic middle age period of 35-45 and a transient period of 55-65.

In chapter II., the health of the criminal is discussed, he is seen to be, if anything, slightly better off than law-abiding people. Disease, except

those associated with alcoholism and venereal conditions, is not related to crime, and except for epilepsy and insanity, morbid conditions *per se* are no part of the force of circumstances by which criminals are made.

Chapter III discusses the mental differentiation of criminals. Temperament, whether phlegmatic, discontented, suspicious, or egotistic, has no connection with crime; temper likewise, except that hot-headed criminals tend to commit violent offences. Now comes what to the eugenist is the most important part of an important document. The chief factor in the causation of crime is mental defect, the coefficient of correlation being .64. Mental defect supplies the link between crime and alcohol (.39), epilepsy (.26), and sex offences (.31). Mental defect is variously estimated among criminals as from 10 per cent. to 20 per cent., the latter probably being the more correct, while in the general population it is only .45 per cent. The crime most associated with it is stock-firing (.529 of those convicted being mentally defective), then wilful damage (22.2), arson (16.7), and so forth down to fraud (0.0). Fraud is found to stand apart from other kinds of crime. Between the criminal's defective intelligence and defective physique there is found to be no connection.

In chapter IV., "The Influence of the Force of Circumstances on the Genesis of Crime," Dr. Goring examines the nationality, education, both formal and effective, employment, alcoholism, the influence of family life in its different aspects, the standard of living of the parents, the age of the subject at the death of the mother, the order of the subject in his family, and the number in the family, as well as the relation of first to subsequent convictions. He finds that an adverse environment is related much more intimately to the intelligence of convicts than to the degree of their recidivism or to the nature of the crimes they commit.

Chapter V. enquires into the fertility of the criminal. Although up to 40 the number in the family is the same as in the law-abiding classes, after that it ceases. Dr. Goring brings forward an interesting psychological theory to account for this curious fact. It is not that the criminal has become sterile, but that the long-suffering wives have become so tired of their husbands' misdeeds that they desert them. Although the criminal comes from the most prolific stocks the average number in the criminal's family is less than half that of the general population.

Chapter VI., on the heredity of the criminal, will prove of especial interest to the eugenist. Here there is a two-fold aim—(1) "to determine the correlation between parents and offspring and between contemporary members of the same family with regard to their convictions for crime"; (2) "to estimate from these facts related to other evidence how far any resemblance in crime depends upon the influence of family contagion." The percentage of criminal offspring increases according as neither parent, one parent, or both parents have been convicted. The correlation between parents and sons is about .60, the resemblance between fathers and sons being slightly greater. The fraternal correlation is about .45. Here, as elsewhere, fraud seems to stand apart from other crimes, there being a very small correlation. The greatest resemblance lies in those classes where there is a taint of habitual or professional criminality—stealing and burglary.

The influence of contagion he places very low. The fact that while only one out of eight criminal men have a criminal wife, every other criminal woman has a criminal husband he accounts for by selective mating. As the average age of marriage is 25 and the modal age of first crime is 19, most criminals have entered on their career before marriage. The women find it harder to gain a law-abiding partner for life than the men.

There is a chapter of general conclusions.

The report brings out, as Sir E. Ruggles-Brice points out in a preface, the fact that the Borstal Institution is the best way of dealing with crime in the individual, although in its connection with mental defect the eugenist will see a deeper line of action.

H. R. S.

SIXTY-SEVENTH REPORT OF THE COMMISSIONERS IN LUNACY. 1913. Part I.
Eyre and Spottiswoode. pp. 125.

This report shows that on January 1st, 1913, the number of the notified insane under care in England and Wales was 138,377, or a proportion of 1 to 267, or 37·48 per 10,000 of the estimated population. Ten years previously the ratio was 34·23, so that during this period it has increased by 9·49 per cent.—in other words the proportion of insane to the population has risen from 1 in 292 in the year 1903 to 1 in 267 in the year 1913. This increase, in view of all the attention which has been paid to the public health during the past thirty or forty years, cannot be regarded as other than disquieting. Compared with earlier figures, say those of 1859-69, the increase in the ratio of insanity is very much greater, but there is a fallacy in this comparison owing to the facts that certification is now very much commoner than 50 years ago, whilst improved care has lengthened the life of the insane and so caused an "accumulation" and increase in the official figures. It is doubtful, however, if there has been any appreciable change in these respects during the past ten years, and the figures quoted would seem to indicate a real increase in the ratio of insanity. In this connexion it may be noted that in the case of London, whose population was practically the same in 1911 as in 1901, the pauper insane during this period have increased by 25 per cent. The Commissioners give some very interesting figures and charts showing the incidence of insanity in the different counties. This varies very much, for reasons which are by no means clear, and it is probable that careful inquiries directed to ascertain these reasons would throw much valuable light upon the whole question of the genesis of mental disease. So far as remedial treatment is concerned, the recovery rates recorded each year do not encourage much hope for further advance, and it will be very gratifying to advocates of eugenics to find that the Commissioners say: "It would seem to be needful to turn from the therapeutic side to the preventive, if insanity is to be effectively controlled . . . The recognition of the share taken in the causation of insanity by heredity, alcoholism and syphilis suggests that an appreciable diminution in its amount might follow on a reasonable application of the principles of eugenics and of social reform." Truly the eugenic movement is advancing when such words emanate from a Government department.

A. F. TREDGOLD

THE REPORT OF THE INSPECTOR UNDER THE INEBRIATES ACTS, 1870 to 1900, for the year 1912. 1914. [Cd. 7281.] Price 3d. Pp. 30

An account of this report, with comments thereon, appears under the heading "The Inebriates Bill" on p. 53.

CENSUS OF ENGLAND AND WALES, 1911. Vol XI. *Infirmities. Persons returned as Totally Blind, Totally Deaf, Deaf and Dumb, Lunatic Imbecile and Feeble-minded.* 1913 [Cd. 7020] Price 1d. Pp xv., 78.

These returns are slightly more detailed than those of 1901, in that persons who are totally deaf are distinguished from those who are both deaf and dumb. They suffer indeed not from lack of detail, but from lack of accuracy, as is admitted with much frankness by the framers of the report, who on that ground "have not felt justified in entering upon an elaborate analysis of the figures". The usefulness of the report is further reduced by reason of the fact that the nature and amount of the inaccuracy is different from census to census, so that the figures for 1911 cannot be fairly compared with those of 1901, and thus allow of any conclusion to

be drawn as to the proportional increase or decrease of the infirmities dealt with.

The following table shows the number of persons per million of each sex who suffer from the defects enumerated:—

		Male.		Female.
Blind	...	760	...	702
Deaf (other than Deaf-Mutes)	...	610	...	860
Deaf-Mutes	...	468	...	373
Insane (including Lunatics, Imbeciles, and Feeble-minded Persons)	4370	...	4604	

The insane, male and female together, form 4,491 per million of the population, made up of 2,957 lunatics, 704 imbeciles, and 830 feeble-minded persons.

CENSUS OF SCOTLAND, 1911. Vol. III. 1913. [Cd. 7163.] Price 2s. 11d. Pp. lvi., 290.

The most interesting and valuable of the records contained in this volume are those which deal with the fertility of marriage. This subject is so important that we will postpone its consideration till the Scottish returns can be examined in combination with those obtained from England and Ireland. Next to this in eugenic importance come the figures giving the numbers of the infirm. These are subject to much the same sources of error as the English, and it is to be regretted that they are not summarised in a strictly comparable form. The following table shows the numbers per million of the population of those suffering from the infirmities enumerated:—

Blind	..	..	...	697
Deaf	..	..	...	845
Dumb	...	.	..	560
Deaf and Dumb	...	..	..	498
Lunatic	...	..	..	3302
Imbecile or Feeble-minded	...	..	..	1662

The deaf and dumb are included both among the deaf and among the dumb, so the proportion of those who are deaf without being dumb is 347, and of those who are dumb without being deaf is 62.

BOARD OF EDUCATION. *Annual Report for 1912 of the Chief Medical Officer.* 1913. [Cd. 7184] Price 2s 6d. Pp. 414.

This report summarises the results obtained in 1912 from the medical inspection of school children, the provision of which is a Statutory duty of each local Education Authority. The opportunity for the systematic observation of large numbers of children afforded in this way to individual school medical officers would appear to an outsider to provide a wonderful field for research into the nature and origin of diseases and defects. That this opportunity is made some use of is shown by the report, which includes reference to many special inquiries. For example, on the relation between heart disease and rheumatism, and on the fluctuations in body temperature among normal children.

The theory that heredity plays any part in the causation of disease is evidently repugnant to some official minds. Thus we find the curious dictum that "Epilepsy is looked upon by *some* as an inherited disease" used to introduce the following statement (p. 111):—"Careful inquiry is made as to the occurrence of heredity by Dr. Hume Griffith in respect of children admitted into the Lingfield Colony, of which he is medical superintendent, and the records of 95 children are shown in the following table:—No information obtainable, 15; no family history obtained of epilepsy or insanity, 40; history of epilepsy in near relatives, 27; history of insanity in near relatives, 8; history of death from convulsions in infancy among members of same family, 5. Deducting the 15 cases in which no family history was obtainable, these figures show a family history of epilepsy in 33·7 per cent.; of insanity, 10 per cent.; of epilepsy, convulsions or in-

sanity in 50 per cent." The statement is not a very good example of how to apply statistical methods, but possibly Dr. Hume Griffith's data are more adequately recorded elsewhere, although there is no reference to any other channel of publication in the present report.

A more pressing question perhaps, from the eugenic point of view, is the part played by heredity in tuberculosis, but although some at any rate of the school medical officers use the presence or absence of family history of tubercle as a guide in diagnosis, it does not appear to have occurred to any of them to investigate this problem. It is to be hoped that some may do so in the future.

PERIODICAL LITERATURE.

ENGLISH.

JOURNAL OF THE ROYAL STATISTICAL SOCIETY, December, 1913, January and February, 1914. The December issue of this journal contains two papers of value to eugenists. Miss Hutchins, in an interesting note on the effect of infantile mortality on the proportion of the sexes, points out that since in districts of high mortality the latter mainly affects the earlier ages of life, the consequence is that the proportion of females living at adult ages tends to be higher than in the Registrar-General's healthy districts. Mrs. Frances Wood's study of the "Course of Real Wages in London, 1900-12" is a valuable contribution to social statistics, and should be read by all who have occasion to consider the problem of working class prosperity at the present time as contrasted with the conditions prevailing some years ago.

In the January number, Messrs. Greenwood and Yule publish a critical analysis of the evidence supposed to show that diseased stocks are peculiarly fertile, and that earlier born children are more liable to be diseased. Their results should be compared with the similar conclusions reached by Mr. J. A. Cobb in a letter appearing in the last number of this REVIEW.

In the February part, the most important paper is "The Fertility of Marriage in Scotland: A Census Study," by Dr. J. Craufurd Dunlop, Superintendent of the Statistical Department of the Office of the Registrar-General for Scotland. This paper is in effect a summary of the results obtained by the census authorities and now published (Vol. III. of the Report of the Twelfth Decennial Census of Scotland. Cd. 7163). Attention may be directed to the marked differences in fertility which characterise the different social classes of Scotland. Taking marriages which had lasted at least 15 years, and in which the wives were more than 22, but less than 27, at the time of marriage, the results are arranged in different groups. Professional and allied occupations were found without exception to be of low fertility, while most of the labouring class occupations exhibited a high rate of fertility. To take a few instances, crofters and coal, shale and ironstone miners yielded mean families of 7·04 and 7·01 children respectively. The figures for agricultural labourers and general labourers were 6·42 and 6·29. At the other end of the scale, we find such groups as physicians and surgeons, with a mean of 3·91, advocates and solicitors with a mean of 3·92, and ministers and clergymen with a mean of 4·33.

In the discussion on Dr. Dunlop's paper certain difficulties of interpretation are noticed.

Another article in this number of interest to eugenists who employ statistical methods is "A Study of Index Correlations," by Mrs. Frances Wood and Messrs. Brown and Greenwood, which treats of some practical difficulties in the interpretation of correlation coefficients.

INSURANCE OBSERVER, January 31st and February 6th, 1914. *Rating of Lives for Family History of Tuberculosis.* Mr. C. A. Elliott, F.I.A. In the first place the experience of the Prudential Assurance Company, recently analysed by Messrs. Rusher and Kenchington, is considered. In these data no distinction appears to have been made between persons with tuberculous parents, grandparents, brothers, sisters, uncles, or aunts. The mortality of such lives as compared with normal experience showed that a life of the former class aged 33 was equivalent to a select life aged 34·8, one aged 45 equal to a select life aged 45·7, and one aged 57 to a select life aged 56·3. Carrying the analysis further, Mr. Elliott concludes that the following method would be an equitable one in the cases of proponents otherwise healthy, but with a family history of tuberculosis.—Proponent under 25, add 7 years; proponent 25-30, add five years; proponent 31-50, add 3 years; proponent 51 or over, take select. These results have a certain eugenic importance as showing that the experience of life assurance societies does not bear out the popular view that family history is without importance in connection with tubercular diseases.

SCIENCE PROGRESS, Jan., 1914. *Recent Advances in our Knowledge of Syphilis.* E. H. Ross, M.R.C.S., L.R.C.P. Pp. 535-546. This short paper covers a wide field. The date of the first appearance of the disease is discussed. Next the history of the discovery of the parasite which causes it is dealt with. Credit for the discovery is usually given to Schaudinn, but Dr. Ross maintains that in reality it is due to Siegel. A description of the life history of the parasite in guinea pig syphilis follows. From this it appears that a process of conjugation occurs, the spirochaete being the male conjugant. The zygote formed by conjugation develops within one of the lymphocytes of the host and there produces fresh forms by budding. The elements budded off enter into fresh lymphocytes, where they may give rise again to spirochaetes or to the female form with which the spirochaete unites. Structures resembling closely the various forms which are produced in guinea pig syphilis have been found also in human syphilis, thus it seems probable that the human parasite has a very similar life history. Recently an epidemic of "rabbit-pox" has been observed among wild rabbits and hares in Norfolk, and this has been investigated by the author, who finds that it is produced by a parasite practically identical with that of the guinea pig. He concludes his paper by suggesting that it may be possible for human beings to obtain protection from the disease by inoculation with rabbit syphilis, just as they are protected against small-pox by inoculation with cow-pox.

The Influence of Nutrition and the Influence of Education in Mental Development. F. W. Mott, M.D., F.R.S. Pp. 460-481. This is the third Chadwick Trust lecture delivered by the author, of which the first two were published in the October number of *Science Progress*. In the present lecture he reviews the conditions necessary for normal mental development and describes the stimuli which bring various kinds of mental activity into play. The practical bearing of the points discussed on the rearing and education of children is indicated.

Eugenics and War. Pp. 591-593. This is an editorial note principally concerned with Chancellor Jordan's lecture on "Eugenics and War" which was published in the October number of the EUGENICS REVIEW. The writer urges that the historical instances adduced by Chancellor Jordan to support the view that the effects of war are dysgenic are not very convincing. He also maintains that instances as good may be brought forward on the opposite side. "For example, one of the most virile periods of English history was that which followed immediately upon the dreadful Wars of the Roses. The greatest development of Prussia followed shortly after the wars of Frederick the Great." The complexity of the whole subject is insisted on and Chancellor Jordan is blamed for not taking it sufficiently into account. The writer also suggests that "universal military training

may possibly have such a good effect as will swamp the occasional loss of good men in the comparatively rare moments of war."

FOREIGN.

ARCHIV FÜR RASSEN- UND GESELLSCHAFTS-BIOLOGIE X., 3; May-June, 1913 (published December 9th, 1913).

Max Hilzheimer : *Beiträge zur Kenntnis der Formbildung bei unseren Haustieren, insbesondere in bezug auf den Schädel* (p. 273-289). A reply to an article by Berthold Klatt, who, in Hilzheimer's opinion, is disposed to exaggerate the physiological aspect of the question as to the development of species of domestic animals and to neglect the morphological. Hilzheimer comes to the conclusion that at any rate in regard to dogs and swine, it is not the form of the skull as such that is transmitted, but the capacity to develop a certain form of skull under certain definite conditions of the environment. Fundamentally, "an animal is the product of inherited characters and the effects of the environment." Not only domestic species, but also some of the sub-species of wild animals are nothing else than forms that have adapted themselves to their environment. If they are placed in other surroundings their distinctive characters will either be lost or modified in a few generations, perhaps even in the first generation. "Although the statement that an animal is exclusively the product of its native soil must not be accepted literally, nevertheless those people who believe that the descendants of a fixed variety must invariably resemble their parents would probably be somewhat astonished at the results if they were to try, for example, to breed a few generations of Percheron horses on the Steppes of Russia, or English bulldogs on the Continent."

Franz Boas : *Die Analyse anthropometrischer Serien, nebst Bemerkungen über die Deutung der Instabilität menschlicher Typen* (p. 290-302). Prof. Boas criticises, among other things, the present method of dividing anthropometric series into a small number of arbitrarily delimitated groups and of drawing conclusions from them by taking the relative percentage of individuals in each. The article is also in part an answer to criticisms of the author's Changes in Bodily Form of Immigrants in the United States, by Sergi, Toldt, Fehlinger and others, who either deny the physiological changes described by Boas or attempt to explain them away as wholly a result of selection or of the correlation between cerebral index and the size of the body (Auerbach, Schiff). Some anthropologists insist upon believing that the cerebral index must be absolutely stable, and therefore prefer to consider the observed phenomena as resulting from an alteration in the composition of the population in question and not as an outcome of actual physiological changes. Sergi holds that rapid alterations in the germinal substance are impossible, and Boas asks if this opinion is not due to an unnecessary narrowing-down of the term plasticity. When the growth of the body is altered by the action of the environment, no one hesitates to presuppose an inherited stature that is strongly influenced by external conditions. Improved nutrition and the elimination of diseases of childhood have in all probability something to do with it. Moreover, children are not born with full-grown heads, and there is a long period of pre-natal development during which external influences have ample time to assert themselves. Boas does not attempt to state what these influences are, but it seems to him much more probable that the cerebral index is altered by the influence of the environment than by selection, which apparently has no connection with the question at all. Not long ago he was able to show that in the case of American Jews the resemblance between parents and children is less in such characters as require a longer period of growth than in such as develop in a shorter time. This must be considered to be another expression of the influence of the environment.

And although Boas does not venture to make universal application of this observation, he thinks it quite probable that it may turn out to be a general rule.

W. Weinberg: *Über neuere psychiatrische Vererbungsstatistik* (p. 303-312). A discussion of some recent studies from Dr. Davenport's Eugenics Record Office, in which it is attempted to apply Mendelian formulae to the inheritance of nervous and mental weaknesses. Rosanoff and Orr (Bulletin No. 5) consider the transmitted tendency to insanity and neuroses of all sorts to be due to the presence of a simple recessive factor, and according to their statistics this would appear quite probable. Weinberg, however, points out that the children under consideration were not arranged according to their ages, and that since the neuropathic constitution frequently does not become manifest until maturity has been reached, the numbers given in the Bulletin must be much lower than those required by the Mendelian theory. Consequently he believes that if all the children were kept long enough under observation the numbers would considerably exceed the Mendelian expectations. Weinberg does not think that the material used is representative in the statistical sense. He mentions further the difficulty of obtaining certain knowledge whether in some cases a neurosis is purely a transmitted character or acquired. It is also obvious that sometimes a neuropathic tendency may remain latent and unrecognised in either the parents or the children, and the possibility must be considered of mutations in the germ-plasm of the parents caused by one or another toxic influence, which finds no equivalent somatic expression. Nor does the failure to obtain Mendelian proportions in a statistical study speak unconditionally either for or against a Mendelian rule when the investigation is concerned with characters whose appearance is dependent upon exogenous inciting factors.

In contrast to Rosanoff and Orr, Davenport and Weeks (*A First Study in Inheritance in Epilepsy*, Bulletin No. 4) start with the assumption that neuropaths are heterozygotic (*simplex*). In regard to Heron's criticisms of the work of the Eugenics Record Office (noticed on p. 365-367 of the January number of this REVIEW), Weinberg does not express a very favourable opinion; but he naturally insists on the importance of making use only of trustworthy and sufficiently complete material.

Stephen Kekule von Stradonitz *Das heutige Kaiserhaus Russlands germanischen oder slawischen Stammes?* (p. 313-325). An interesting paper in which is shown by quotations from the memoirs of Catharine II., that the father of the Emperor Paul II. and consequently the male ancestor of the present ruling house was not the German Karl Peter Ulrich, Herzog of Holstein-Gottorp, afterwards Peter III., but the Russian Sergei Vasilievitch Saltykoff.

Dr. Klatt replies to Dr. Hilzheimer, and Dr. Lenz and Sanitätsrat Weinberg continue their controversy over the inheritance of haemophilia in the *Discussionen und Erklärungen*.

ARCHIV FÜR RASSEN- UND GESELLSCHAFTS BIOLOGIE, X., 4; July-August, 1913 (published January 30th, 1914).

W. Weinberg: *Auslesewirkungen bei biologisch statistischen Problemen*, I. (p. 417-451). From a projected treatise on methods of investigating problems in heredity. Both clinical and statistical methods are useful, but the former do not yield results that can as a rule be accepted as final. Genealogical tables are deceptive for the reason that often what appears to be in them a rule is perhaps only an exception. In doing statistical work one must learn to place an equal value on all facts, whether they are of a positive or a negative sort. A description and elucidation of the author's *Geschwister* and *Probanden* methods follows: In studying the genetic qualities of parents, we should not use as material such of their children as are known to have inherited the characters under investigation, for the reason that since they are known to possess these

characters; their inclusion must tend to prejudice the result by exaggerating the number of cases in which the characters in question occur. On the other hand, by making use of a sufficient number of the brothers and sisters of such children, it is probable that we can obtain more correct results. On p. 420 Dr. Weinberg makes the statement that "when we find a character, which we hold to be transmissible, in a child and not in his parents, if we have no reason to believe that external influences alone have caused it to be latent in the parents, we conclude that the character has a purely innate capacity for remaining latent, and therefore assume that it must be a simple recessive factor. We should, however, remember that in reality the conditions are more complicated, that the visible appearance of a character must depend upon the coincidence of several endogenous factors." It would perhaps have been well to mention, for the sake of avoiding misunderstanding, the possibility that some transmissible characters which appear in children and not in their parents, among them perhaps the most significant of all from the point of view of social pathology, may be a result of mutations or modifications of the germ-plasm caused by external, or by a combination of external and internal, influences.

Constantino Bresciani-Turroni (Palermo): *Über die Korrelation zwischen Körpergrösse und Kopfindex* (p. 452-469). The conclusion reached in this paper is that, in so far at least as the investigations described have extended, the correlation between size of body and cerebral index is very small, if indeed it exist at all.

J. Strebel (Zurich): *Korrelation der Vererbung von Augenleiden (Ektopia lentium cong., Ektopia pupillae, Myopie) und Herzfehlern in der Nachkommenschaft Schleuss-Winkler* (p. 470-478). Ectopia lentis congenita is a dominant character, as Bateson supposed, and there are some indications of its belonging to a sex-modified type of inherited defect. From the accompanying genealogical table and the cases described, it is evident that the factor of inheritance must also be considered in the case of so-called non-congenital defects of the heart. The study of genuine correlations throws important light on the diagnosis and etiology of otherwise obscure complexes of symptoms.

Walter Claassen: *Die Ausbreitung der Geschlechtskrankheiten in Berlin, 1892 bis 1910* (p. 479-483). Using the most recent *Statistische Jahrbuch* and its returns covering the number of cases treated by the *Gewerkskranikenverein* to which 22 per cent of the working men of Berlin belong, Dr. Claassen comes to the conclusion that from 22'5 to 34 per cent., at the most, perhaps one-half of the male workers of Berlin are syphilitic or have been so at one time during their lives. Although these figures are very different from F. Lenz's 90 per cent. (comp. his paper in No. 1 of the *Archiv* for 1913), whose results were based upon the number of cases of general paralysis treated in Berlin asylums, nevertheless, as Claassen says, "this fact is in itself so terrible that it would scarcely seem necessary to exaggerate it." The same statistical material shows the possibility that since 1892-94 the incidence of venereal diseases (mainly syphilis) among men has increased by more than two-thirds, since 1896-1900 by one-third, and threefold among women since 1896-1900. In the *Discussionen und Erklärungen* (p. 503-6) Lenz endeavours to show that his 90 per cent. result is justified by the material used by Claassen.

Paul Kaznelson (Prag): *Über einige "Rassenmerkmale" des jüdischen Volkes* (p. 484-502). An interesting paper on certain peculiarities in the somatic characters of the Jews, whose explanation is to be sought in the history (racial composition) of the Jewish people (Physiognomy, blonde types), also physiological and pathological characters (sexual and intellectual precocity), relative immunity to phthisis, insanity and diabetes.

HENRY BERGEN.

ZEITSCHRIFT FÜR INDUKTIVE ABSTAMMUNGS- UND VERERBUNGSLERRE.
 Band 2. Heft 1 and 2. Nov., 1913. *Vererbungsgeschichtliche Einzelfragen.* III. V. Haecker. Pp. 1-9. Professor Haecker continues his discussion of the outstanding problems of heredity and evolution. In this article he deals with the inheritance of acquired characters. He distinguishes four principal forms which the so-called evidence of this mode of inheritance takes. First there are the cases of the inheritance of an induced pathological character as in the famous experiments of Brown-Séquard; secondly, cases of inheritance of aberrant rather than of pathological characters as in the experiments of Blaringhem; thirdly, there are the cases of change in some highly specialised adaptive character such as instinct induced by a change in the environment of which examples may be seen among domestic animals; fourthly, cases of the inheritance of some new character directly induced by the environment as in the experiments of Kammerer. Professor Haecker suggests that an explanation may be found in what he calls the Pluripotenzhypothese; by this he means that we may think of the organism as containing many potentialities, some alone of which materialise; when, however, a change in the environment occurs other potentialities may materialise and may continue to do so in the offspring, although no longer subject to the same environment.

Colour Inheritance in the Horse. E. N. Wentworth. Pp. 10-17. This article deals with recent experiments and observations upon horse breeding. The author is searching for "factors" that will account for the observations. It is obvious that the facts known offer very great difficulties to any explanation by means of factors, and do not admit of the relatively simple explanation of colour inheritance in mice and other animals.

Die Variations Kurve in der Biologie. F. Auerbach. This is a long technical paper of considerable interest to those who are acquainted with modern statistical methods.

Artbildung bei der Copepodengattung Limnocalanus durch akkumulative Fernwirkung einer Milieuveränderung. S. E. Kman. Pp. 40-104. The author has made certain observations of great interest upon two species of Limnocalanus. These observations are summarised at the beginning of the present paper; they have been published in detail elsewhere. It appears that Limnocalanus grimaldi in late glacial times inhabited the sea off the Scandinavian coast. Since glacial times the land has been raised, and in consequence from time to time lakes have been formed containing Limnocalanus grimaldi. These lakes have gradually become fresh, and in those lakes that have been longest separated from the sea we find a form Limnocalanus macrurus that is quite distinct from Limnocalanus grimaldi. A careful examination of a series of these lakes, however, shows a number of intervening forms that exhibit every grade between the two species, and according to the author the extent to which the fresh water forms differ from the marine form depends upon the length of time that the former have been isolated. It has further been found that these various forms are inherited and not directly due to the environment. Upon the basis of these facts the author founds a lengthy discussion of some sixty pages. It is of considerable interest, but the conclusion alone can be noted here. He rejects selection as an explanation and is inclined to believe in the cumulative influence of the environment; this influence shows itself so slowly that it cannot be observed in ordinary experimental work.

ZEITSCHRIFT FÜR INDUKTIVE ABSTAMMUNGS- UND VERERBUNGSLERRE.
 Bd xi. Heft 3. January, 1914. *Studies on Variation and Selection.* A. L. Hagerdoorn and A. C. Hagerdoorn. Pp. 145-183. This paper takes the form of a series of comments upon several problems connected with variation, inheritance, and selection. It

is suggested that the term "unit-difference" is to be preferred to "unit-character," and that the phenomenon of "dominance" is of very secondary importance. It is maintained that recent work has shown that both continuous and discontinuous variation may be due either to genetic or non-genetic factors; from this it follows that both forms of variation may at some time be inheritable and at another time non-inheritable. The authors then enter into a long criticism of Castle's experiments. Castle concluded from these experiments that "unit-characters" could be modified by selection; it is argued here that this conclusion was not justified. There follows some criticism of statistical methods in the study of inheritance and some interesting comments upon the increasing number of instances in which it is held that a series of genetic factors influence development in the same direction.

Notiz über den Begriff der Kryptomerie. E. V. Tschermak. Pp. 183-191. The author used the term "Kryptomerie" some years ago to indicate the phenomenon of the appearance of completely new characters—that is to say, of characters that do not arise by the recombination of factors in crossing. He suggests in this note that this may be due to the origin of a lasting association between characters already present, or to the breaking down of such an association. This differs from the result of ordinary crossing when factors may be differently combined; for it is supposed that there is a change in the influence of one factor upon another.

Versuche über Selektion und Vererbung bei vegetativer Vermehrung von Albium salivum. P. Vogler. Pp. 192-199. Experiments were undertaken to answer two questions. Can distinct strains be isolated by selection from a population increasing by vegetative reproduction? Is selection of small variations within a strain effective? The answer to the first question is yes, to the latter no.

MAANEDSSKRIFT FOR SUNDHEDSPLJEJE, 1913. *The Investigation of the Inheritance of Deaf-mutism for Eugenic Purposes.* Dr. Soren Hansen. Pp. 97-106. The Danish Anthropological Committee has now begun a thorough investigation of the inheritance of deaf-mutism on the basis of records from the deaf-mute institutions, supplemented by additional information furnished by doctors and clergymen throughout the country. A number of pedigrees have already been traced and specimens of these are given in this paper.

EUGÉNIQUE, December, 1913. *L'Alcool et L'Eugénique, Alcoolisme et Divorce.* Dr. P. L. Ladame. Pp. 177-191. In Geneva during the decade 1901-1910 there were 1,812 decrees of divorce, and 676 of these were on the ground of the drunkenness of one of the spouses. This number must be regarded as a minimum estimate of the number of divorces due to alcoholism. To it must be added many of those cases in which the ground was cruelty or violence, since the effect of alcohol on more or less pathological and degenerate brains must often be the cause of cruelty and violence. Yet it must not be argued that the suppression of alcohol would stop nine-tenths of the divorce cases. The case is by no means as simple as this since mental defect is often the cause of alcoholism.

EUGÉNIQUE, Jan., 1914 *Les Progrès de L'Eugénique.* Dr. C. W. Saleeby Pp. 1-15. A lecture delivered before the French Eugenics Society on January 7th Dr. Saleeby describes the bearing of mendelian research on eugenics, passes some strictures on biometry, and claims that the Lamarckian theory of evolution provides a sound basis for a eugenic policy. His pronouncements, particularly on the subject of biometry, drew some searching criticisms from M. March, whose remarks appear in the report of the discussion which followed Dr. Saleeby's paper. They are well worth reading.

EUGÉNIQUE, Feb., 1914. *Le Retour au type dans les Métissages humains.* Dr. J. Laumonier. Pp. 33-49. Two pedigrees of families derived from different racial crosses are described. In the first a blond Hanoverian prisoner of war married in 1806 a dark, grey-eyed native of Anjou, with the result that Hanoverian characteristics appeared in some, but not half of their children, and in two succeeding generations were completely blotted out. In the second a Frenchman, resident in China, married, in 1820, a Chinese. The majority of their children were Chinese in appearance. One daughter, however, had predominantly French characteristics. She remained in China, married a Chinaman, and had children who were all predominantly Chinese. Another daughter, of Chinese appearance, lived in France and married a Frenchman, her children and grandchildren have practically no Chinese characteristics. From cases such as these Dr. Laumonier formulates the following "law":—"The products of mixed marriages bear a closer resemblance to the parent, of either sex, who belongs to the country in which they live than to the other." He regards this "law" as explaining such facts as the tendency for the blond type to disappear, which has been noted in France, Switzerland, South Germany, and England, but it is obvious that the evidence now brought forward is insufficient to establish its truth.

BULLETIN DE LA STATISTIQUE GÉNÉRALE DE LA FRANCE. Tome III., Fasc. II. Jan., 1914. Of especial interest in this number are (1) the report on the working of the old-age pension scheme in France (p. 151). (2) The results of the examination of the 1911 batch of recruits (p. 155) in the French Army. The most important fact which emerges from this is that in those districts in which the average size of the family is large the degree of education seems relatively low and vice versa. (3) An elaborate and detailed statistical study by de Ville-Chabrolle, entitled *Le Travail des Femmes en divers Pays, principalement dans L'Industrie, le Commerce et les professions libérales.*" Pp. 170-223. This article contains a perfect mine of information concerning the numbers of women engaged in various occupations in different countries, the percentages which can be deduced from these numbers, and the changes which the numbers and percentages have undergone in the last thirty years.

RIVISTA DI ANTROPOLOGIA. Vol. xviii. 1913. This substantial volume opens with an article by Prof. Alfredo Nicetoro *Su alcuni indici della distribuzione dell'intelligenza e delle attitudini tra gli uomini* already noticed in the July number of this REVIEW. Prof. Giovanni Marro presents a detailed study of the skeletons of ancient Egyptians found in the necropolis at Assuit dating from 2500-3000 B.C. This is followed by a well illustrated essay in which Giuseppe Sergi attempts to place the Tasmanian race in the light of recent anthropological investigations chiefly by English and German writers of whose works he adds a bibliography. Dr. Calza next discusses a particular malformation of the skull known as *bathrocephalia* in normal persons and in criminals. The measurement of intelligence in relation to biological and social factors is dealt with by Dr. Saffotti in a somewhat severely statistical manner, and there are a few shorter papers besides on kindred subjects.

H. RAND.

POPULAR SCIENCE MONTHLY. Jan., 1914. *The Mechanism of Heredity as Indicated by the Inheritance of Linked Characters.* Professor T. H. Morgan. Pp. 1-16. The author explains the linking or coupling of characters which sometimes occurs in Mendelian inheritance by the hypothesis that the factors representing characters so linked or coupled are born in the same chromosome. The coupling occurs with various degrees of intimacy, being sometimes a rigid bond and at other times merely a slight tendency for the characters to be associated together in inheritance. In order to explain this a further assumption is necessary. This is supplied

as follows:—"It may be observed that when homologous pairs of chromosomes unite before maturation of the egg and sperm that they twist round each other. In consequence parts of each chromosome may come to be on one side of the twist, and other parts on the other side. If at times the chromosomes break at the crossing point, and each then unites with that part of the other chromosome that lies on the same side, the new chromosomes that emerge later from the pair will be made up of parts of each chromosome to the extent to which breaking has taken place at some of the crossed levels. In consequence the two new chromosomes are no longer made up of the same parts as the original chromosomes, but of pieces of both." Thus the linkage will be disturbed or broken. The theory outlined above is illustrated by reference to observations made on the results of crossing different varieties of *Drosophila*, the fruit fly.

Cancer Research. Dr. Leo Loeb. Pp. 17-38. In a very clear and interesting manner Dr. Loeb describes the nature of the various growths to which the name of cancer may be applied and summarises what is known of their causation and distribution. The question of inheritance is not gone into at all exhaustively, but what is said on the subject is of sufficient direct interest to eugenists to be worth quoting in full:—"Hereditv is undoubtedly a factor in those cancers which develop occasionally in case of xeroderma pigmentosum or from pigmented moles. We know that here the conditions preceding cancer are hereditary and therefore cancer itself is indirectly hereditary. We furthermore know that a certain class of cancers originates on the basis of embryonic malformations, and inasmuch as these are under certain—as yet not well defined—conditions hereditary, we may assume that certain cancers belonging to this class are also hereditary. There is indeed some evidence which points to this conclusion. There is, for instance, a case known in which both the mother and her one and one-fourth years old child became affected by glioma of the retina (a tumour originating in modified nerve cells of the eye). In another case a twenty-one-year-old man had 17 osteomata (tumours consisting of bone tissue) symmetrically arranged, and his father had similar tumours. It is furthermore known that in certain cases polypus of the intestines are congenital and occur in several members of the same family. On the basis of such polypus cancer not infrequently develops."

A Comparison of White and Coloured Children measured by the Binet Scale of Intelligence. Josiah Morse, Ph.D. Pp. 75-79. The white and coloured children tested belonged to the schools of Columbia, South Carolina. The coloured children had, in the same manner as the white, come from good homes and seemed to do their best in the tests, nevertheless a certain superiority was shown by the white children, as is indicated in the following comparative table:—

	Coloured Per cent.	White. Per cent.
More than one year backward .	29·4	10·2
Satisfactory . . .	69·8	84·4
More than one year advanced	0·8	5·3

POPULAR SCIENCE MONTHLY, Feb., 1914. *Current Progress in the Study of Natural Selection.* Dr. J. Arthur Harris. Pp. 128-146. In this paper, which is a continuation of previous articles in the same journal, Dr. Harris summarises definite evidence of a statistical nature as to the occurrence of natural selection. He distinguishes two problems: (1) To determine in any given case whether the death-rate is random or selective; (2) to ascertain what physical, physiological, or psychological characteristics make for fitness or unfitness for survival. As the work is already a summary no

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attempt will be made further to summarise it here, but reference may fittingly be made to Dr. Harris' original contributions to the subject. Working on garden beans, he found that those seeds which germinated were not a random sample of the whole number planted, but that a certain definite selection had occurred in that the very large beans and the very small beans had to some extent been weeded out. Thus the variability of those which germinated was distinctly less than that of the whole number planted; the average size was also somewhat greater. Corresponding results were obtained also with regard to seedlings. Nine thousand normal and abnormal plants from a large number germinated in the greenhouse were planted out in the field, and it was found that the mortality was distinctly higher in the normal than in the abnormal plants. Dr. Harris concludes by remarking that "evidences of the occurrence of natural selection for many characteristics are rapidly accumulating. That mortality is not random, but differential, and that the intensity of the selective death-rate is a problem open to quantitative treatment are propositions supported by large bodies of sound scientific evidence."

THE CHICAGO MEDICAL RECORDER. Vol. xxxv. No. 11. Nov., 1913. Contains reports of the addresses delivered before the Chicago Medical Society on October 1st on the subject of the teaching of sex hygiene in the public schools. Professor C. R. Henderson, in describing the methods and aims of the Chicago Society of Social Hygiene, of which he is president, said (p. 596) that it was instituted for study and for giving information in regard to sex hygiene, and expressed the hope that education with reference to sex, biological science, morals and physical training will be taught to young and old. He gives two warnings; first, that instruction is the least part of education, a high ideal must be instilled. Secondly, that if disease could be prevented and sin made safe, while prostitution was yet left, only half a victory would be won. Sex hygiene must not deal too exclusively with prevention and with venereal poison, but the deeper lying effects of character poison must also be prevented.

In "*The Innocent Bystander*," p. 590, Dr. William Belfield states that in several of the United States a girl may lawfully sell her body for sexual purposes at 10 years of age, but may not sell a ring until she is 21. This being the law, it may be accepted as an official utterance of public sentiment that sexual indulgence among the unmarried is one of the personal rights of men, and that this is a recognition of an instinct common to animals and men. It is now realised that this policy is detrimental not only to the individual, but to the State as well, and that the instinct to procreate must be restrained and regulated by the State, as are the savage instincts to rob and slay.

In discussing *Practical Possibilities*, p. 600, Mrs. E. Flagg Young reported that in 1912 the Chicago Board of Education appropriated five thousand dollars for lectures to fathers and mothers on sex hygiene, and in addition ten thousand dollars for such instruction in the High Schools of the City during 1913. Two conditions were laid down. First, that the lecturer must be a medical man or woman; second, that he must have the power of dealing with the subject in a serious, noble, and high-minded way. Mrs. Young thought that boys could be taught in large classes, but girls in not larger groups than fifteen to twenty. That parents should have option of allowing a child to attend or not.

Instruction in the School (p. 603) was dealt with by Dr. Rachelle Yarros, while Rev. John W. Melody spoke of the desirability of giving *Instruction in the Home* (p. 606), and discussed what the nature of such instruction should be and some of the objections to it.

THE TRAINING SCHOOL BULLETIN. Vol. x. No. 8. Dec., 1913. *Mental and Physical Development of Normal Children.* E. A. Doll. Pp. 113-120. The material of this article is taken from a chart compiled

by Professor Johnson (formerly of Clark University). The data were originally gathered from the publications of Dewey, Tracy, Kirkpatrick, and others. The compilation has been rescued from obscurity, and is now presented in the form of continuous paragraphs. The child's development is divided into five periods: (i.) 1-3 years, (ii.) 4-6 years, (iii.) 7-9 years, (iv.) 10-12 years, (v.) 12 years onwards. Under each period changes in height, weight, brain, muscular development and activity, sense-perception, memory, imagination, interests, language, judgment, and reasoning are summarised in two or three concise sentences. Sex differences are noted in the later periods. Figures are given only occasionally, and minor inaccuracies have not been revised in the light of later literature. But the article is of great value as giving, in an extremely compact yet readable form, a reliable summary of the bodily and mental growth of the normal child.

CYRIL BURT.

BULLETIN OF THE AMERICAN ACADEMY OF MEDICINE. Vol. xiv., No. 6, December, 1913. *The Schoolhouse as a Crime Contributor*, E. C. Elliott. *The Physical Bases of Crime, from the Standpoint of the Judge of a Juvenile Court*, E. F. Waite. *The Physical Bases of Crime as Observed by a Prison Physician*, Rock Sleyster. *Crimes of the Adult from the Standpoint of the Alienist*, F. W. Robertson. *The Physical Bases of Crime—Viewed from the Prison*. Z. R. Brockway. Pp. 383-411. These papers, read at the annual meeting of the American Academy of Medicine last June, deal with various aspects of the problem of criminality. The subjects discussed are rather too large and complex to admit of being adequately surveyed in the few pages which the authors have been able to devote to their consideration; and as a result the papers are somewhat vague and sketchy. They are interesting, of course, as expressing the opinions of men of judgment and experience, and many of the views put forward are sound and practical, but for the most part the authors have had to be content with assertions in lieu of proofs, and such facts as they have adduced in evidence have not always been presented in a very critical spirit.

Professor Elliott, in his remarks, emphasises the importance of using the school as a centre for the physical and social activities of children outside of school hours, and advocates measures for securing a more continuous operation of school influences, so as to enable them to compete more successfully with the crime-producing influences of the streets. Mr. E. F. Waite, who writes with the authority of his experience as a judge of the Juvenile Court of Minneapolis, expresses the opinion that physical defects are responsible for an appreciable proportion of juvenile delinquency. He attaches, of course, a still greater importance to the influence of mental deficiency, and he notes in this connection that in a series of young offenders brought before him on examination by the Binet-Simon tests showed that about 25 per cent. were feeble-minded. Similarly, the Seattle Juvenile Court, one of the few that command the services of an expert psychologist, reports that 18.5 per cent. of the delinquency with which it deals is attributable to mental defect. Mr. Waite's experience leads him to urge very strongly the systematic examination of the mentality of juvenile delinquents with a view to the detection and segregation of the feeble-minded, a measure which he rightly considers imperative both for the protection of society from the criminal and for eugenic ends.

In his paper on "The Physical Bases of Crime as Observed by a Prison Physician," Dr. Sleyster summarises the results of his anthropometric observations on 1,521 convicts in the Wisconsin State Prison. He lays special stress on the fact that these convicts showed a marked inferiority in height, amounting on the average to 1'8 inch, as compared with the typical American, the standard for the latter being taken from

the measurements reported by a number of life insurance companies and referring to over 220,000 adults. Dr. Sleyster unhesitatingly sets down this shortness of stature as "a marked and unmistakeable stigma of degeneracy"; but it would appear to be susceptible of other explanations, and one of the most obvious is suggested by the fact, recorded in another table in this paper, that upwards of 30 per cent. of the Wisconsin prisoners are foreign-born. Mr. Brockway, who maintains the same thesis of the organic inferiority of the criminal, also remarks that of the Elmira prisoners "a majority were themselves immigrants or the immediate descendants of immigrants from the crowded parts of Southern Europe"—a fact which might quite sufficiently account for their lack of inches. Anthropometric statistics which take no regard of racial differences are obviously of very qualified value. Dr. Sleyster attributes much importance to defective sight, both as an indication of degeneracy and as an actual cause of criminal conduct through the influence of the nervous strain incident to refractive troubles. He found defective vision in about a third of the prisoners, astigmatism and myopia being specially frequent. More details on this point would be of interest, as also data for comparison with the non-criminal population. The papers of Dr. Robertson and Mr. Brockway deal with the question of crime and the criminal in general terms, their views being in the main similar to those of the other writers.

THE JOURNAL OF HEREDITY. Vol. v. No. 1. Jan., 1914. *How to Improve the Race.* Alexander Graham Bell. Pp. 1-7. The author points out that the methods of practical eugenics must be entirely different to those of the animal breeder. If the breeding of animals were restricted by law and sentiment in the same way as that of human beings he believes that it would be impossible to improve them by selection. In his opinion little is to be gained by preventing the reproduction of defective and undesirable stocks, and the most hopeful means of advance is by the mating of the most desirable with one another. Yet "It is neither practicable nor advisable that the individuals referred to (the desirables) should marry exclusively among themselves but only to a much greater extent than now prevails."

Eugenics and Breeding. O. F. Cook. Pp. 30-33. This paper teaches a somewhat similar lesson to that of Mr. Graham Bell. The eugenist has aims and must use methods differing from those of the animal breeder, but yet may learn a useful lesson from the experiences of the latter. For a knowledge of the laws of heredity, on which eugenics is based, may be acquired by plant and animal breeding. The cultivation of the eugenic instinct is more important to the future of the race than the weeding out of defective persons.

Prenatal Influences. David Starr Jordan. Pp. 38-39. The author insists that the theory of maternal impressions and of telegony have no basis in fact.

SOCIAL DISEASES. Vol. iv. No. 4. This number is taken up mainly with three papers read at the annual meeting of the American Society of Sanitary and Moral Prophylaxis, held at New York in April, 1913. Two of these papers referred to the effect produced by syphilis on the nervous system and its connection with insanity. The authors insisted on the close connection between syphilis and general paralysis. Dr. Goodhart, the title of whose paper was "Syphilis and the Nervous System," stated that about $2\frac{1}{2}$ per cent. of infected people developed this condition: onset occurring about 15 years after first infection. In its hereditary form syphilis produced infantilism, hydrocephalus, and general paralysis. Dr. Kirby (syphilis and insanity) stated that 14 per cent. of the admissions to the New York State hospitals were due to general paralysis, this representing the ratio of the disease amongst the lower criminal classes. He quoted Plaut to the effect that 45 per cent. of the children of paretics were

mentally or physically damaged, or both. Dr. Fisher read a paper on "The Necessity for Social and Statutory Recognition of Syphilis," in which he urged that this disease should be treated on the same lines as any other infectious disease, and that all individuals suffering from it, who happened to come under State control, whether as criminals or recipients of public charity, should be detained until the infectious stage was past. The general tone of the meeting was in favour of notification, and repressive measures in respect of the marriage of syphilitics. The experiences of the State of Michigan in this connection are instructive. Assuming, as we must, that syphilis is a race poison, and one that as eugenists it is our duty to combat, it is none the less necessary for us to consider most carefully our strategy in this campaign. Nothing is simpler than to issue laws restricting the right of syphilitics to marry, nothing in appearance more righteous. When, however, we come to enforce this rule have we any right to assume the presence of syphilis, that is (in present popular acceptance) of guilt in the accused, without evidence? As far as the man goes, perhaps, knowing the risks run by the average adolescent male; certainly not in the case of the woman, unless very definite reasons are adduced for suspicion. This objection may be got round no doubt on the plea of the importance of the danger to the public in general, but the existence of the objection will not tend to make the administrative application of the rule any the easier. Having overruled this objection, how are we to find out the presence or absence of infection? The Wassermann test is the only even approximately certain test, and this demands the services of an expert, not many of whom are available except in large centres. The proof being found and marriage forbidden, can we, prohibiting marriage, prevent concubinage? In the socially speaking "upper" classes perhaps, in the lower certainly no. And the further down the social scale we go, the less possible will it be to prevent this short cut to the fulfilment of the desires of the men and women affected. What remains? The prison or the lethal chamber, and in addition, what is even worse, one law for the rich and another for the poor. This is not to say that the case is hopeless. Far from it. Education and facilities for efficient treatment will do much; in time, a very long time, perhaps all we hope for. Until the public are educated, the more cautious our advance, the more successful is our final attack likely to be.

QUARTERLY CHRONICLE.

CENTRAL SOCIETY.

February 5th.—At the Grafton Galleries, 5.15 p.m., Professor C. Spearman on "The Inheritance of Mental Energy." Chairman, Dr. Edgar Schuster.

March 5th.—At the Grafton Galleries, 5.15 p.m., Mr. M. W. Keatinge on "Education and Eugenics." Chairman, Major Leonard Darwin.

February 16th.—First "Galton Anniversary" dinner and lecture at the Hotel Cecil. Lecture on "Francis Galton" by Sir Francis Darwin, F.R.S.

COMMITTEES.

January	12th.—Finance Committee Meeting.
"	16th.—Executive Council "
"	29th.—Research Committee "
February	20th.—Executive Council "
"	26th.—Informal Council discussion, 12, Egerton Place. Subject, "What Reforms in the Treatment of Habitual Criminals should now be Advocated on Eugenic Grounds?"
March 25th.	—General Council Meeting.

MEETINGS.

December 21st.—Mr. R. Dixon Kingham at the Anerley Congregational Church on "Parenthood and Patriotism."

January 14th.—Dr. Murray Leslie before the Free Woman Discussion Circle on "The Woman's Aspect of Eugenics."

January 17th.—Dr. D'Ewart before the Eugenic Study Circle of the Oldham Branch of the Workers' Educational Association on "Eugenics and the Workers."

January 27th.—Mr. R. T. Bodey before the Headingley Young People's Guild on "Eugenics."

January 27th.—Meeting at the Brighton Royal Pavilion to inaugurate a branch of the Society. Speakers : The Mayor, Major L. Darwin, Mrs. Gotto, Councillor Wellman, Rev. F. Asher, Dr. Hobhouse, Mr. A. O. Jennings.

February 4th.—Mr. R. T. Bodey before the Halifax Branch of the Child Study Society on "The National and Scientific Aspects of Educational Policy."

February 5th.—Miss Bonwick before the St. Luke's Girls' Social Club.

February 6th.—Dr. M. Greenwood before the Hampstead Scientific Society.

February 13th.—Mr. R. Dixon Kingham on "The Eugenic Ideal" before the Nottingham Branch of the Workers' Educational Association.

February 25th.—Dr. Edgar Schuster on "Eugenics" before the Biological Club of the Working Men's College, Crowndale Road.

March 3rd.—Mrs. Gotto before the St. Paul's Literary Society, Croydon, on "Literature and Eugenics."

March 3rd.—Mrs. Gotto proposed at the Croydon Women's Debating Society that "Government on Eugenic Principles is both a social and economic advantage to a community."

March 6th.—Mrs. Gotto before the Walton-on-Thames Girls' Club on "Eugenics as a Practical Policy."

BIRMINGHAM HEREDITY SOCIETY.

On February 3rd a lecture was delivered by Dr. A. F. Tredgold on "Degeneracy." The lecturer deprecated the manner in which certain enthusiasts had allowed Weissman's views to become an obsession, so that they denied that the somatoplasm could have any influence on the germ plasm at all. He emphasised the fact that circulating toxins in the parental blood, from whatever source derived, had a very definite effect on the germ plasm, and ascribed most cases of degeneracy in the offspring to this cause. He also asserted his belief that such degeneracy, especially in the form of a weakened nervous system, could be again transmitted by heredity, though the particular *form* in which the degeneracy manifested itself might be different in parent and child. The lecturer evidently believed that certain acquired characters could be transmitted, and though he quoted no extensive statistics to prove his case, the members present were deeply impressed by his views. After a few questions which could only touch the fringe of an enormous subject, the meeting concluded with a hearty vote of thanks.

On March 6th Dr Edgar Schuster very kindly stepped into the breach caused by the postponement of Dr. Mjöen's intended tour. The title of his paper was "Eugenics and Human Analysis," and he dealt extensively with the efforts which he and others are making to measure physiological and psychological qualities. Prefacing his remarks, he said that before qualities could be compared they must be measured, and his description of the methods by which this was attempted in the case of mental qualities was always interesting and frequently very entertaining also. While freely admitting that the difficulties of accurate measurement were great, Dr. Schuster considered that data sufficiently accurate for the determina-

tion of the coefficients of mental correlation between various relatives, could now be obtained, and hinted, moreover, that a psychological examination of this kind might come to replace in part the ordinary type of examination so unpleasantly familiar to the modern student. The former measured the mental capacity, the latter only the mental content. The subject proved rather too technical to arouse much discussion, and after Dr. Schuster had answered a few questions, the proceedings terminated.

J. PERCIVAL MILLS, Hon. Secretary.

BELFAST BRANCH.

February 11th, 1914.—A public meeting of the Belfast Branch was held in the Queen's University on this date. The Right Rev. Dr. D'Arcy, Bishop of Down, presided, and introduced the speaker of the evening, the Rev. H. J. Rossington, M.A., B.D. The subject of Mr. Rossington's paper was "Eugenics and Politics." The able manner in which the various eugenic problems were handled elicited the admiration of the audience. In the discussion which followed, Bishop D'Arcy, Canon O'Connell, and Dr. W. J. Wilson took part.

March 10th, 1914.—On the afternoon of this day the Belfast Branch had the privilege of hearing a lecture on "Practicable Eugenics" delivered by Prof. J. Arthur Thomson, M.A., of Aberdeen University. There was a large and representative audience, including many public men and the leading members of the clerical and medical professions. In the unavoidable absence of Dr. D'Arcy, Bishop of Down, the chair was taken by Mrs. D'Arcy, who, in a very suitable manner, introduced Prof. Thomson. Through the generosity of the Lady Mayoress, the reception was held in the Carlton Hall, and though the Lady Mayoress was unable to be present on account of having to leave Belfast before the meeting was held, she was really our hostess in absentia.

Prof. Thomson's address was warmly appreciated, and though some thought he did not go far enough in any of his eugenic suggestions, still the beauty of the literary expression of the lecture appealed to all. Since there were many present to whom eugenics previously had been a mere name, the Branch could not have secured a lecturer better able to put the subject in a more agreeable light.

A vote of thanks to Mrs. D'Arcy and Prof. Thomson was proposed by Sir Otto Jaffé, seconded by Dr. Campbell, President of the Methodist College, and conveyed by Prof. J. A. Lindsay, M.D. At the conclusion tea was provided by the kindness of the Lady Mayoress.

W. JAMES WILSON, Hon. Sec.

HASLEMERE BRANCH.

A meeting of the branch was held on Monday, February 2nd, at St. Edmund's School, Hindhead, when Miss Morgan-Brown opened a discussion based on the article, "A Criticism of Eugenics," from the October, 1913, REVIEW.

The branch arranged a public meeting on Saturday, March 14th, at the Haslemere Hall, when Major Leonard Darwin spoke on "Eugenics and Some of Its Unsolved Problems." Lord Parker of Waddington took the chair.

L. E. MUIR, Hon. Sec.

LIVERPOOL.

Council meetings have been held on January 19th, February 13th, and February 25th. The annual meeting was addressed by the President upon "Positive Eugenics"; the report and accounts for 1913 were read and passed, and three officers re-elected; Miss James, Dr. Nathan Raw, F.R.S.E., and Dr. George Macleod were elected to vacancies on the Council. The February meeting was addressed by the Rev. James Hamilton, M.A., upon "Christianity and Eugenics." The Hon. Secretary

spoke to the St. Mary's Men's Society on "The Trust of Life," and has lectured twice in Yorkshire. A small library has been formed for the use of our members, but too recently to record its working.

R. T. BODEY, M.A., Hon. Secretary.

MANCHESTER AND DISTRICT.

During the first quarter of the year two public meetings have been held. The first was addressed by Dr. Starr Jordan, but, being held in the afternoon, was not a great success numerically.

On March 10th the second was addressed in emergency by Dr. D'Ewart on "Eugenics and Insanity," the main theme being that as the bulk of insanity in England was attributed to heredity, alcohol, and syphilis—preventable causes—the amount of insanity might be reduced greatly in a very short time. Questions were numerous.

During the quarter members have been very active. Dr. Vipont Brown has spoken on "Eugenics" and allied subjects on several occasions. Mr. Warburton, of Romiley, addressed a meeting there dealing generally with the "Eugenics" and specifically with "Feeble-mindedness." The Hon. Secretary addressed a large meeting of teachers at the North of England Education Conference at Bradford on January 3rd, the address leading up to Miss March's paper on "Sex Training." He also spoke to a meeting of young men in the gymnasium of the Y.M.C.A. on "Venereal Diseases." The attention was as intense as usual when this subject is definitely dealt with, and the numerous questions were remarkable for their insight and intelligent grasp of the situation.

During the next few weeks the annual meeting will be held, and a public meeting on "Venereal Diseases." Dr. Catherine Chisholm is to speak on "Sex Training," and the Hon. Secretary has been invited to address a group of "Scouts."

J. D'EWART, Hon. Sec.

OXFORD BRANCH.

On March 3rd, Mr. Rolleston Stables lectured before the Oxford Branch on "Eugenics." Professor Poulton was in the chair.

E. SCHUSTER, Hon. Secretary.

A New Branch of the Society at Brighton.—A new branch of the Society has been opened at Brighton, of which the mayor, Mr. Otter, is president, and Mr. Wellman temporary honorary secretary. On January 27th a public meeting was held at the Pavilion, the mayor presided, and speeches were made by Major Darwin, Mrs. Gotto, and others, after which the Rev. Felix Asher proposed that "a branch of the Society should be opened in Brighton." This was passed unanimously. Members of the audience wishing to join the new branch were asked to send in their names to the Committee of Management, who undertook to call a meeting and formally adopt the constitution of the Society at an early date. The constitution was formally adopted at the meeting held on February 17th, and was ratified by the General Council on March 25th.

A Course of Instruction in Statistics will be given at the Lister Institute of Preventive Medicine on Fridays, at 5.30 p.m., during May—July, 1914, by Dr. M. Greenwood, Junr. The syllabus is as follows:—General Principles of Statistical Method. Chief Sources of Data. Census Reports and Registrar-General's Reports. Birth and Death-rates and how they are corrected. The nature of a Life Table. The measurement of Variation. The Standard Deviation. Frequency Curves. Significance of Deviations from an Expected Value. Sampling Errors. Simple cases of Mendelian proportions and their testing. Correlation and Regression. Multiple Correlation and multiple Regression. So far as possible the

classes will be informal and mainly devoted to practical work and discussion. Although no previous knowledge will be assumed, students will find it helpful to have read an elementary book on statistics, such as "A Primer of Statistics," by W. P. and E. Elderton (Black, price 1s. 6d.), and if they could find time to revive their acquaintance with elementary algebra this would also be an advantage. The fee for the course is one guinea. Application to join should be made to the Hon. Secretary, Eugenics Education Society, Kingsway House, Kingsway, W.C.

Introduction to the Study of Heredity—Professor McBride, of the Imperial College of Science and Technology, has arranged a course of lectures to be given in his department by Mr. H. M. Fuchs, and has most kindly invited the council of the Eugenics Education Society to nominate a certain number of students, who will be admitted to the course free of charge. The lectures will take place at 5.30 p.m. on Wednesdays, commencing Wednesday, April 29th, and closing Wednesday, June 24th. Members and associates wishing to attend should send in their application to the Hon. Secretary immediately, to be placed before the council.

The following is the syllabus of the course:—

1. *Introductory.* The organism and cells. Growth and cell-division. Sexual reproduction. Germ-cells. Maturation. Fertilisation. Development. Origin of germ-cells and their relation to the body. Other modes of reproduction.

2. *Heredity and Evolution.* Heredity, meaning of term. Inheritable and non-inheritable characters. Nature of species. Darwin's evidences for evolution.

3. *Variation.* Methods of recording variability. Inheritable and non-inheritable variations. Pure races and populations.

4. *Analysis of Heredity.* Hybridisation—Mendel's work. Its implications. Unit-characters, segregation, dominance, etc. Reversion.

5. *Analysis of Heredity (continued).* Presence and absence theory. Quantitative characters. Coupling and repulsion of characters. Relation of Galton's statistical law to Mendel's law.

6. *Heredity of Sex.* Mendelian interpretation. Parallel phenomena of cytology. What are the carriers of hereditary qualities? Determination of sex. Sex-limited characters.

7. *Changes in Heredity.* Mutation. Causes of the origin of new characters. Theories as to the origin of new races. Directions of future work.

8. *Inheritance in Man.*

Mesure de l'Intelligence is the title of the lecture which Dr. Simon, the well-known colleague of Dr. Binet, has consented to deliver before the Eugenics Education Society. By the kind permission of the Royal Society, the lecture will be held at Burlington House on Tuesday, April 28th, 8.30 p.m. As the accommodation is limited, admission will be by ticket and members should apply for tickets without delay. The subject of the lecture is of so much interest to others as well as eugenists, that after April 15th tickets still unappropriated by members will be sent to other persons who wish to attend.

Sex Education and Eugenic Training has been made the subject of a course of four lectures by Miss N. March. They were especially arranged for parents and teachers, and held at the Holborn Estate Girls' School between March 20th and 30th.

The Present State of the Science of Eugenics.—Under this heading a letter from Prof Pearson to the *Times* was discussed, and we greatly regret to say his words were accidentally misquoted. The extract should have read as follows:—"But even he in the last few months of his life saw that the popular movement he had started was likely to outgrow its knowledge, and feared that more evil than good might result

from it." As printed in the REVIEW the word "years" was substituted for the word "months." Our sincere apologies are due to Prof. Pearson for this mistake, and the consequent alteration in the meaning of his words. In this discussion we also stated that "In 1910, when Sir Francis Galton's health was failing considerably, much of the correspondence was carried on by his niece, Miss Biggs." As these words may possibly have given the impression that Sir Francis was failing mentally during this period, it may be as well to state definitely that this was not intended. We believe that he remained perfectly clear in intellect until the end. The object of our note was to show that Sir Francis Galton did not withdraw his approval from the work of the Society. This is shown by the fact that he remained honorary President of the Society till his death.

A Course of Criminal Anthropology.—We have received from the "Faculté Internationale de Pédiologie de Bruxelles" particulars of a course of six lectures on this subject to be given by Dr. Vervaeck. The first lecture deals with the history and evolution of criminal anthropology. The second with the influence of the environment in the production of criminals. In the third the nature of the criminal is discussed, while the fourth deals with heredity as a factor in the causation of criminality. The fifth and sixth are practical demonstrations of the methods of examining the physical and mental condition of criminals at the *Laboratoire d'anthropologie pénitentiaire de la prison de Forest*, of which the lecturer is the director.

PUBLICATIONS RECEIVED.

- Amidexterity and Mental Culture*, by H. MACNAUGHTON-JONES. (Publisher: W. Heinemann, London, 1914. Price 2s. 6d. Pp. 102.)
- Cavour and the Making of Modern Italy*, by PIETRO ORSI. (Publishers: G. P. Putnam's Sons, London, 1914. Price 5s. Pp. 385.)
- Child Life and Labour*, by M. ALDEN, M.D. (Publishers: Headley Bros., London, 1914. Third edition. Price 1s 6d. Pp. 191.)
- Commercialised Prostitution in New York City*, by G. J. KNEELAND. (Publishers: Grant Richards, Ltd., London, 1913. Price 7s. 6d. Pp. 334.)
- Eugenics and Social Welfare, Bulletin No. 3* The Bureau of Analysis and Investigation State Board of Charities. State of New York, 1913. The Capitol Albany, New York. Pp. 130.
- Immigration*, by H. PRATT FAIRCHILD. (Publishers: The Macmillan Co., New York, 1913. Price 7s 6d. Pp. 455.)
- L'Uomo Medio*, by CORRADO GINI. (Publisher: Athenæum, Roma, 1914. Pp. 24.)
- Mental Deficiency (Amentia)*, by A. F. TREDGOLD, L.R.C.P., M.R.C.S. (Publishers: Ballière, Tindall and Cox, London, 1914. 2nd Edition, Revised and Enlarged. Price 12s. 6d. Pp. 491.)
- Prostitution in Europe*, by A. FLEXNER. (Publisher: Grant Richards, London, 1914. Price 7s. 6d. Pp. 455.)
- The Cancer Problem: A Statistical Study*, by C. E. GREEN, F.R.S.E. (Publishers: W. Green and Sons, Edinburgh and London, 3rd edition, 1914. Price 5s. Pp. 98.)
- The Courtship of Animals*, by W. P. PYCRAFT, A.L.B., F.Z.S. (Publisher: Hutchinson, London, 1913. Price 6s. Pp. 318.)
- The Great Scourge and How to End It*, by C. PANKHURST, LL.B. (Publisher: E. Pankhurst, London, 1913. Pp. 155.) Deals with the prevalence of venereal disease. A clear statement of the facts of the case. The author sees a solution of the evil in "Votes for Women and Chastity for Men." With regard to the latter there are no two opinions, but it is difficult to see why the former should materially affect the case. It does not seem necessary to await an extension of the franchise before attempting to remedy the evil.

- The Health of the State*, by SIR GEORGE NEWMAN, M.D., F.R.S.E. (Publishers: Headley Bros., London, 1913. Price 1s. 6d. Pp. 198.)
- The Mother's Reply: A Pamphlet for Mothers*, by NELLIE M. SMITH. (Publishers: The Society of Sanitary and Moral Prophylaxis, New York, 1914. Price 10 cents. Pp. 24.)
- The Problem of the Continuation School and Its Successful Solution in Germany: A Consecutive Policy*, by R. H. BEST and C. K. OGDEN, B.A. (Publisher: P. S. King, London, 1914. Price 1s. Pp. 79.)
- The Quarterly Review*, Nos. 432, July 1912, and 437, October, 1913.
- The Unfolding of Personality as the Chief Aim in Education*, by H. THISELTON MARK, M.A., B.Sc. (Publisher: T. Fisher Unwin, London, 1912. Price 1s. Pp. 224.)
- Travail et Folie*, by DR. A. MARIE and DR. R. MARTIAL. (Publisher: Bloud et Cie, Paris, 1909. Pp. 111.)

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PROBLEMS IN EUGENICS.—Vols. I. & II.

PAPERS COMMUNICATED

TO

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THE EUGENICS REVIEW

EDUCATION AND EUGENICS.

By M. W. KEATINGE,

Reader in Education in the University of Oxford.

LEADING biologists have recently warned the advanced wing of the eugenist party that violent interference with the composition of society, while not impossible, is beyond a near limit unjustifiable in the state of present knowledge. As an illustration of such a warning we may take a statement of Professor Bateson. "It is evident that while the elimination of the hopelessly unfit is a reasonable and prudent policy for society to adopt, any attempt to distinguish certain strains as superior and to give special encouragement to them would probably fail to accomplish the object proposed." . . . "It must suffice to point out that whereas our experience of what constitutes the extremes of unfitness is fairly realisable and definite, we have but little to guide us in estimating the qualities for which society has or may have a use, or the numerical proportions in which they may be required."¹ It may well be believed that the position here adopted is too modest. The educational systems on which all civilised communities spend much thought and large sums of money are based on the assumption that the more thoughtful and experienced persons in each generation are in tolerable agreement as to the kind of knowledge, of outlook on life and of disposition as resulting from the acquisition of this knowledge that should be possessed by the average individual, while a committee of the leaders of any profession, of, say, doctors, or lawyers, or schoolmasters, would not disagree to any great extent in their estimate of the qualities most desirable in the ideal doctor, or lawyer, or schoolmaster. Further, if it is the case, as this paper will attempt to

¹ Mendel's Principles of Heredity. W. Bateson, 1913, p. 305.

show, that the aims of eugenics can best be attained through education, these aims will in the main be dictated by the educationist rather than by the biologist. It will therefore be taken for granted that we are not wholly without social ideals, and that these are based on a knowledge of what is fitting. Our present task is to decide the relative value in attaining these ideals of the method of direct attack advocated by eugenics and the more indirect methods of education.

In comparison with the treatment of the problems of segregation and sterilisation the subject of this paper may well seem dull; for it aims merely at an analysis of the relations that exist between current doctrines of heredity and the process of education. It will suggest no violent assault on or glorification of the sexual rights of the individual but rather will deprecate the crude suggestions that sometimes are made in this connexion as likely to excite prejudice against rather than sympathy for the eugenic movement. Of these suggestions one illustration must suffice, taken from a paper by C. Ehrenfeld, of Prague. He demands a new procreative hygiene and sex morality: would have boys studied very carefully through all the school grades and have all modes of education adjusted to bring out all the best points in their characters. Those boys found to be superior should be allowed to revert to the primitive conditions in which the best male qualities, courage, prowess, and idealism, were stimulated to win the female, and a few such carefully selected youths should be freed from the limitation of monogamy and allowed more than one mate of the other sex.¹

With the validity or the reverse of this demand we are not here concerned, but rather with the likelihood that it might give offence to some readers and cause amusement to others, but in neither case would issue in the modification or development of any practical educational activity. Apart from this defect the statement is in itself remarkable as the only expression of opinion by a man of science that the writer has been able to discover in which any useful connexion between education and eugenics is even suggested. As a rule indeed the modern biologist asserts his disbelief in education as a biological factor.

¹ Die konstitutive Verderblichkeit der Monogamie und die Unentbehrlichkeit einer sexual Reform. Archiv f. Rassen und Gesellschafts-Biologie. 1907.

A recent Harveian Oration¹ on the *Inheritance of Mental Characters* reaches the following conclusion, "The manifest bearing of these truths on the principles of education indicates that the right object of education is to fit human beings for their social existence, to make them good citizens and to afford those with gifts above the average the opportunity of developing them. Education modifies and largely makes the individual, but it does not affect the biological evolution of a race." Another writer says, referring to Galton's proof that characters such as vivacity, popularity, conscientiousness and humour are inherited, "The result is of great importance practically; it shows how little room is left in the development of the individual for the effect of environment even on the intellect or mind in the broadest sense of the word. The kind of mind is irrevocably decided before the child is born. Hence the hopes held out of improving the race by education . . . are illusory."² And again, "If man is to any appreciable extent the creature of his environment then improved conditions will improve the race. But if, as the study of heredity suggests, though it would be rash to say it is proved, man is almost entirely the product of inborn factors which are scarcely affected by environment, then improved conditions may only encourage the propagation of the degenerate." To quote another writer, "It is comparatively easy to improve the condition of the individual by improving his environing conditions—cleaning him, educating him, leading him to higher ideals in his physical mental and moral life. But as this is easy so it is impermanent. All this is modificational and has no effect on the stock. This is not opposed by the eugenist; it simply is no part of his province for its effect is not racial."³ Indeed, the same writer attempts to show that education though it does not help the cause of eugenics certainly can hinder it. "A race desiring progress would foster mutation. As a matter of fact our social custom leads us to look with disfavour upon most youthful traits that seem unusual or out of the ordinary. It would be difficult to devise a system of

¹ H. B. Donkin. 1910.

² Doncaster. Heredity in the light of recent research. 1910, p. 49.

³ W. B. Kellicott. The social direction of human evolution. 1911, p. 30.

education which could more effectively repress than does our own the development of unusual mental traits. In this connexion 'abnormal' or 'eccentric' may often mean a mutation in a profitable direction."

One final quotation from Dr. Carveth Reid¹ will suffice with those already given to indicate the position which seems to be adopted by present-day thinkers. "Education is the beginning of all culture and of the higher human life, and fortunately it is now so necessary to the sustentation and defence of each generation that more and more care will certainly be given to it: so that it can do no harm to mention that in the opinion of most biologists *it does nothing to improve the breed*: that if this be true it does some harm by enabling many to live who would otherwise have been eliminated, and by increasing the amount of formally trained ability with which original genius must contend before it can obtain recognition; and that the higher education of women especially, tasking their organisms to the utmost in order to prepare them to get their own living, or for any other purpose except marriage, is likely to unfit them for marriage and for maternity." If we add to this the warning of Karl Pearson that if you educate a race which is degenerating you get no results commensurate with the efforts expended, it seems tolerably clear that the eugenist does not give education much encouragement and that biology will not throw its weight into the scale when an attempt is made to direct more money from the Exchequer into educational channels. The remarks that follow will attempt to show that the authors quoted are under a misapprehension as to the nature of education and have overlooked some important relations in which it stands to problems of heredity; that if, as some of them suggest, education is not merely indifferent to eugenics but actually harmful, this indicates at least a definite relationship, the nature of which might be reversed; that far from being indifferent or harmful to eugenic processes education of the right kind is the main avenue by which for practical purposes the problems of eugenics should be approached and the chief instrument by which the aims of the eugenist can be effected;

¹ Natural and Social Morals, p. 305.

finally, that although our acquaintance with the aims of human existence is small and our grip of social problems is weak, we have some knowledge of the types and quality of mind and capacity that might be accepted as desirable in a civilised community.

A science of education propounds and seeks to answer two main questions. (1) Who shall be educated, (2) What kind of education shall be given to those selected for this privilege. The first problem is largely one of administration, the second one for the school, but to neither can an answer be given except in terms of heredity and selection.

Beginning with the administrative problem "Who shall be educated?" we see the full significance of this question if we imagine a community which is convinced of the value of the education that it is prepared to supply, but which has at its disposal only a limited education fund and consequently wishes to ascertain how this can best be expended. Is the fund to be distributed over the entire population, or are certain classes, financial or social, more likely than others to respond to education and to make a greater contribution to the national welfare? The answer given to this question has varied from age to age. The educationalists of the Renascence and the century and a half that succeeded it were generally of opinion that the really important person was a prince or a nobleman, and accordingly with considerable uniformity they wrote treatises on the education of princes and noblemen. Even as late as the eighteenth century we find Defoe producing a tractate on the education of a prince. The reason for this selection of princes was not primarily eugenical. Princes were considered not the most educable, but the most influential of mankind. In the society that these writers had in view education could make itself felt only from above. It was aristocratic in its nature; a chosen few could spread ideals, could set the fashion in certain directions considered desirable, and through their influence in dispensing honours could give a "survival value" to the standards of behaviour or to the knowledge that they had been taught to respect. In the long run and indirectly the approval of leaders in fashion has a distinct bearing on the eugenical problem, but

the doctrine that is the opposite of the "Prince" theory, the doctrine that education begins from below, stands in a far closer relation with it; for it starts from the position, not clearly enunciated, but always in the background, that all men are equal. This, indeed, it conceals behind the specious phase "equality of opportunity," without pausing to consider that opportunities are quite as much subjective as objective, that they are produced by a reaction upon external circumstances of the person who finds the opportunity, and that no matter how carefully circumstances are equalised certain favoured persons are "selected" for the opportunities that they afford. For Rousseau, as for the modern labour member who demands that state funds shall be spent on elementary rather than on secondary education, the doctrine of equality is the guiding principle; for the educational reformers of the Long Parliament, as for those of the French Revolution, the doctrine that there was a favoured class whose education, more than that of any other, would yield a good return to the community was anathema; for the self-made factory owners in the early years of the nineteenth century the success that they had achieved seemed to them possible for every poor lad to whom facilities for self-culture were afforded. And yet these very factory owners were themselves illustrations of inequality, for from among a host of others they had been selected to discover the opportunities that circumstances offered. They were indeed the result of a long series of selective influences which had operated generation after generation among their ancestors, who in many cases were farmers in the Yorkshire dales. Nowhere is this more clearly shown than in the most interesting of them, the socialist Robert Owen. Owen believed firmly in the power of education to produce characters of any kind, and to convert the feeble into the forcible. "According to the machinery used for the purpose, the character," he says, "will be well or ill manufactured and the individual will become inferior, mixed or superior in his qualities." Unfortunately for his theory one element, at least, in the conditions of Owen's success is given to us in a tell-tale sentence at the beginning of his biography. His father, we are told, was an artisan and his mother was the eldest of the large

family of a very respectable farmer, and was remarkable for her beauty as well as for her qualities of mind. Here at once before our eyes are eugenical conditions. A family from which Owen's father had been able to select his wife because it was large and which had been selected for survival and for good repute because it was respectable. In short, our State when it puts to itself the question, "*Whom can we most profitably educate?*" finds that modern doctrines of heredity give it this answer in no equivocal terms. "If you want men who will be leaders, if you want men with driving power, if you want men who will stand with your enemies in the gate, you must educate that class in which the principle of selection has acted most directly and with greatest force." Education considered from the stand-point of the individual educated has directive power; it can give interests, and can substitute a desirable interest for a bad one, but it will not turn a feeble character into a forcible one, it will not produce virility where this does not exist or grit where it is wanting. In these directions its action will be ameliorative but not very marked. The character which would have indulged feebly in vice may be led to indulge in virtue—with equal feebleness; the person who has no power of leadership will be converted not into a force that will drive others in the direction that he approves, but into a voice crying in the wilderness and deplored that people will not follow his lead. Education, let it be repeated, has directive power, vigour is produced by selection.

In which class of society is the selection in marriage for which we are searching most markedly to be found? Let us divide the community into three divisions, the artisan and labourer class, the class of small traders and small professional men which has no reserve of capital and for whom in each successive generation the struggle for existence is intense, owing to its higher standard of life and culture, and the well to do classes with a reserve of capital which renders their continued existence relatively safe. In the first of these classes there is practically no selection for marriage, as far as the man is concerned. All labourers marry if they will, and, in the opinion of many, the earlier they marry the better, since deferred

marriage implies that at a time of life when their energies for manual work may be flagging they will still be hard pressed by the claims of a growing family. How far does the labourer select his wife with care, and on what principles? This is a question not easy to answer with any certainty, but there seems reason to believe that no very great effort is made to secure in the wife sterling habits of mind or character.

In the rich class with a considerable reserve of capital, again, any man marries who wishes. The standard of living may be high, but the standard of unearned income is equal to it. Consequently there is no selection for marriage. We cannot assume that marriage implies in the man superior grit or reserve force; and if, further, we ask on what principles the rich select their wives, we are driven to the conclusion that ornamental qualities, usually, are the determining qualities. An extreme case of this we find our young men of wealth marrying chorus girls, a process which when stated in terms of selection means that they are selecting for the most superficial qualities girls who frequently have been driven to their mode of life because their fathers have been selected for failure owing to the absence in them of those qualities which the State most needs. By the method of exclusion, therefore, we are driven to the professional classes with no reserve of capital behind them as the class of society in which selection is most likely to be found. In these classes the men are all selected for marriage. The standard of living and of culture is so high that only those with marked qualities of endurance and intelligence contrive to earn an income which permits of marriage with prudence, and owing to the deferred age at which marriage takes place there is a further process of selection in the choice of the wife, a choice in which good sense and a due recognition of the mental and moral qualities which are of real value in life must play a considerable part. It may be added that in this class a process of selection is taking place on the female side also. Those girls who are lacking in what are considered characteristically feminine qualities, and who therefore would make indifferent mothers, tend more and more to secure a training for professional life of some kind. In many cases they are

averse from marriage, or at any rate do not feel drawn towards it or to lay themselves out for it, thus making it more likely that the choice of the man selected for marriage will fall upon a person who is eugenically suitable.

It is, of course, true that these tendencies towards deferred marriage have their reverse side. The increased demand for comfort and the undue deferring of marriage which it entails leads to very small families, and thus the supply of children from this source may be insufficient in the next generation to supply the demand of the community for leaders. In consequence it is necessary to cast the educational net wider and to capture for a higher education those sports and freaks in the mechanical classes who have qualities of intelligence and endurance markedly superior to the average of their fellows. But this topic lies beyond the limits of this paper and it remains only to point out this disquieting fact, that such sports when they have been found and when they have been suitably educated will, indeed, be of use to their generation, but cannot be depended on to breed true and supply leaders to the next generation. For the tendency always will be for their children to revert to the general level of the class from which the parents come, a class which is *ex hypothesi* less sturdy intellectually than the professional class. This position seems more than justified by the very large number of instances in which self-made men of real ability appear to pass on to their children few, if any, of the qualities which have enabled them to survive in the struggle for existence. Whether there is any counter-process or antidote for this tendency, and whether this counter process can in any way be furthered by educational means may be discussed later.

Our State then is justified in expending a larger portion of its educational fund on the children of the professional class than on those of the labourer class, and principles of heredity play an important part in guiding its choice. It must not however be forgotten that the position as it has here been set forth holds good only of a complex and rigidly stratified social system such as is found in wealthy European countries, and that increased education of the right kind applied to the whole community would in the course of years by introducing ideals of

perfection do much to leaven all classes with a spirit of healthy selection in marriage.

II.

We may now turn from this administrative problem to the problems of education proper and ask what guidance is given to educationalists by an analysis based on educational principles. Before proceeding it will be necessary to establish a few positions. In what follows it will be assumed that acquired characteristics, though in the long run they may possibly tend to modify inborn qualities, are not inherited from generation to generation in any very marked or easily observable degree. The qualities produced by education being acquired characteristics are therefore not directly reproduced in the offspring, and it is this non-inheritance of the qualities acquired at school that gives to the schools of a community and to the persons who teach in them their paramount importance. In the absence of the inheritance of acquired characteristics it is the teaching staff which insures that the acquired qualities of one generation shall be transmitted to the next, and we thus have two distinct channels of heredity, one physical, transmitting inborn qualities, and the other social handing down through the educational system the culture of one generation to the next. That these two channels should stand in a proper relation to one another is of the utmost importance, and it is (*a*) because they tend to lose touch with one another, and (*b*) because the true connexion between them is not realized that biologists deprecate the eugenical significance of the school. It will facilitate the development of the argument if we inquire which kind of heredity is of the greater efficiency in producing vigorous exponents of any art, science, or moral standpoint.

For education to be effective there must be in the child some disposition or inherited instinct to react upon it. Education in music will afford an illustration. The best instruction in music given to a large number of children who have no natural gift for music will produce only musical mediocrities, and the higher the class of music taught, in other words, the more it differs from the musical standards of the children's parents the feebler will be the impression made by the instruc-

tion given. No matter how good the instruction may be the result will be little more than a superficial symbolism which never will result in the enthusiastic promotion of music or the production of new musical compositions of the first class. On the other hand, if the tendency to music is a strong inborn instinct in the child, teaching of moderate quality and quantity will produce a very marked effect. In this case therefore a strong line of social heredity, *i.e.*, a good staff of music teachers, divorced from a strong line of physical heredity is markedly ineffective, while the reverse of this combination is as markedly efficacious. Most efficacious of all are the conditions when we find a gifted son taught by the father whose inborn qualities he inherits as in the case of Wolfgang and Leopold Mozart; for here the inborn qualities of the son are surrounded and stimulated by an environment that exactly suits them and enables the processes of imitation and suggestion to operate to their fullest extent. An extreme case will serve as a further illustration. The influence in a school of a good music teacher upon a number of only moderately gifted pupils will, in succeeding generations, prove to be almost negligible from every standpoint in comparison with the influence upon the society of their time, of a family of, say, four or five musical children, who have been brought up in musical surroundings, have drunk in traditions of music with every pore and go forth into the world ready to promote musical interests, and in turn to found families in which this particular art will be cultivated with zeal.

It thus appears that in comparison with physical heredity, or unless it is backed up by physical heredity, social heredity may cut a very sorry figure; and, indeed, under certain conditions it may prove far more futile than it has yet been shown to be. It is a corollary of the position that acquired characteristics are not markedly inherited that a stock tends to acquire an immunity against those influences in its environment whose action upon it is harmful. Of the persons dwelling in an insanitary neighbourhood some are more liable to disease germs than others. These contract disease and die, in many cases before they have produced offspring, leaving the survivors to hand on to their children the inborn quality of resistance to the

disease. The next generation is consequently more immune and in so far as it is not it is subjected to precisely the same process of weeding out. Finally an almost complete immunity is produced, a state well illustrated by the power of the negro to live with impunity in malarial districts, to the deadly influences of which the European who does not take the greatest precautions readily succumbs. Just such an immunity against the traditional education of a country may be produced if the two lines of physical and social heredity do not stand in an intimate relation with one another. This immunity will grow from generation to generation, and its growth will be proportionate to the existence in conjunction with one another of the three following factors. (1) A subject matter of instruction that is out of relation to current needs or antagonistic to current sympathies. (2) Teachers who are sufficiently skilled to impress effectively this subject matter of instruction and the attitude of mind which it involves on those of their pupils who are in sympathy with it, but who (3) have insufficient social prestige and influence to make the value of these ideas felt throughout the community.

If the ideas or ideals that are put forward by an educational system are purely traditional and arbitrary, or too remote from the needs of every day life, or if the attitude of mind and modes of thinking inculcated are at variance with the crude methods by which practical men feel their way towards a comfortable income and matrimony; if the moral code which is taught is too far in advance of that in common use, even though on abstract grounds it may be desirable, in other words if it stands in little relation with current practice it will biologically be a drawback to the individual to have come under the influence of the educational system, and as a result immunity to this knowledge or this attitude of mind or of feeling will gradually be produced. It is because of this progressive immunity against educational influences that much of the education of the past has been so amazingly ineffective, and the process is so subtle and so little realised, that the danger from it is great. A few concrete instances will make the position clearer. The school of the older type laid inordinate stress on the classical languages, and

in particular upon the abstract principles of grammar and syntax that underlie them. Some pupils responded to this type of teaching, others did not. Those who did went through the ordinary stages of a school and university career and became schoolmasters or fellows of their colleges. They seldom, unless they happened to inherit it, became possessed of a substantial income, and they frequently remained unmarried. Those who did not respond to the educational influences provided, who were in fact considered the stupid members of their families, went into commercial life where by assiduity and the possession of sound qualities on the perceptual level they frequently reached positions of affluence. They married relatively young, and in turn sent to school, to be subjected to the same educational influences that they had themselves as boys rejected, children whose inborn characteristics rendered them immune to the efforts of their teachers. These teachers, no doubt, marvelled at the ever-growing stupidity of the boys sent to them from certain social classes, little realizing that the cause was simply this: the subjects taught and the attitude of mind encouraged had no survival value, and immunity against them was slowly, but surely, being produced. The writer can himself instance the careers of the sons, three in number, in one family of his acquaintance. Of these sons two were distinctly less clever than the third and failed to respond readily to the customary educational influences. The third was what would at school be called a clever boy, took scholarships in the ordinary course of nature and went to a University. He is now, at middle age, a schoolmaster on a small salary and unmarried. The two others, on leaving school, responded readily to the commercial stimulus, have now assured positions in commerce, are both married and are sending sons to our great schools, all of them quite immune to the intellectual influences of these establishments.

If the argument be transferred from the sphere of intellectual alertness to that of morals it needs little proof to show that in many communities if an ideal, of, say, scrupulous honesty were inculcated in schools, and if it were effectively adopted by a certain number of pupils, it would certainly hinder

them from making their way in a society whose conduct was guided by principles of another kind. As long as the knowledge and the standards supplied by education are not those on which the community sets a value, educational effort will be sterilised by this immunity which is acquired against it, and the process can be stopped in two ways only, (1) by teaching only those things and giving only that social outlook which are commercially effective in life; (2) or, far preferably, by having in a society a teaching staff of such intellectual, moral and social influence that, with the aid of the acknowledged leaders of thought, it can force on a whole community the ideals and the outlook that it considers right, and thus by giving them a survival value, insure that the pupils who come to their schools shall progressively from generation to generation be by nature more fitted to receive them and to act in accordance with them.

In the foregoing remarks the case against social heredity, and therefore the case that, if the conditions are bad, can be made out against the effectiveness of educational activity, has been stated with emphasis; but it must not be imagined that the statement is in sympathy with the contempt of the eugenist for education which already has been mentioned. Even for aggravated cases of ineffectiveness, such as the production of immunity to education, a remedy has been suggested, while the distrust of education evinced by the biologist is an absolute one. Let us examine its validity.

As far as the existing generation is concerned it may well be granted that the province of education is merely directive, that it has to utilize to the best and to guide into profitable channels the inborn instincts and aptitudes that are provided for it as raw materials to work on, and that given third class material it will not convert it into first class capacity. Thus much may be conceded to the biologist; but when we turn to the generations that succeed we find that a new factor, one that, most surprisingly, he has overlooked, has entered into the situation. The biologist forgets, or at any rate no biologist has yet stated explicitly that the education received by the individual, the way in which inborn qualities have, some of them, been repressed, some of them developed and intensified, cannot fail

to affect the manner in which he either selects or is selected in marriage. Unless the veneer of education has been of the feeblest and most superficial kind and is cast off as soon as schooldays are over, the ideals, and tastes, down to the smaller habits of preference in food and in dress, cannot fail to condition the choice made or acquiesced in by the pupil when the time for marriage arrives. It is here that biologically the schoolmaster comes by his own; it is here that for the first time he is able to affect the race, indeed cannot fail to affect the race, in a manner which will either be eugenic or the reverse. A person educated to a certain social position will almost certainly marry a person of the same social position; his attitude to religion, to literature, to art and music, to political life will lead him to choose a mate who, to a greater or a less degree, is in sympathy with his views and tastes, and thus his choice is largely conditioned by his upbringing.

A striking proof of this general position that there is a tendency for persons of similar characteristics to be drawn together is afforded by Professor Karl Pearson's statistics, derived from observation of 1,000 to 1,050 cases of husband and wife. These show that the correlation between them for stature, span and forearm is upwards of .2. To quote Professor Pearson, "We see at once that between the same physical characters in the husband and wife of adult children there is . . . a most remarkable degree of resemblance, greater than that of great-grandparents to their great-grandchildren (about .19), and probably greater than that of first cousins to one another. We could hardly want stronger evidence of assortative mating in man."¹ Further evidence is afforded by the statistics of the correlation between the length of life of husbands and wives in the Wensleydale district, in Oxfordshire, and in the Society of Friends, which amounts to .22. In moths a still more remarkable correlation is to be found. By the courtesy of Professor Poulton I have been able to observe in the Hope Department of Zoology, at Oxford, some specimens of *Epitoxis albicinata* (Hampson), a day flying Syntomid moth. Of eleven pairs of this moth caught *in coitu* on Bugalla island in the

¹ *Biometrika* II. p. 373.

Sesse group, north-west Nyanza, and on the shore near Kampala by Dr. G. A. H. Carpenter, six show very marked resemblance of degree of spotting on a black background.

A consideration of this indisputable fact of homogamy leads us to two further questions. (1) How far is it desirable that like should marry like? (2) If it is desirable, in what way can education further the process, and with what possible results? The first question can be briefly answered in Karl Pearson's own words¹ "I had previously found in Mr. Galton's family records that the correlation in stature between *husband and wife* was .09, but between *father and mother* of adult offspring .18, . . . that is to say that homogamy is a factor of fertility"; and it is thus clear that if we wish unions to be fertile, that is to say, if we wish to combat a falling birth-rate among the desirable classes, the fostering of homogamy may well be one of the elements that will operate in the direction desired. Before proceeding to answer the second question, namely, how the selection of like by like may profitably be fostered by education, it will be well to consider more generally what are the best conditions of selection and how can education further them.

For selection to take place under the best conditions two things are needed. (1) The production of offspring on a larger scale than is actually necessary to carry on the affairs of the community. (2) The existence in considerable numbers of persons who differ widely from one another in respect of inborn characteristics. Unless these two conditions are provided selection will be feeble. At the present time both these conditions are badly supplied, for the birth-rate among the professional classes is falling heavily and the course of social development seems to produce in members of the community uniformity and likeness rather than diversity. What can education do to promote both these conditions?

1. The restriction of offspring in the professional classes, in so far as this is intentional and is not due to other causes, is largely due to a false standard of comfort and to ignorance of what is true culture. It is the first business of education to supply knowledge and disseminate ideals. It can hardly com-

¹ Biometrika II. p. 373.

plain if it is asked to lay stress on simplicity of life, if it is requested to conduct its operations so that on leaving school its pupils shall realize that the pleasures which are the best for the individual and the community are at the same time the least expensive, indeed, that true culture is scarcely compatible with ostentation and luxury. Indulgence in the pleasures of art, of literature, of classical music, of conversation, can now be enjoyed at a less cost than at any time in the world's history. It is not to these that the rise in the cost of living is due, but to a senseless desire for motor cars that are unnecessary, for travel that has no object, for food that is superfluous, for drink that is hurtful and for clothes whose beauty varies inversely with their cost. The introduction to modern society of truer and saner standards is the work of education. Once this work is done the financial pressure will be relieved and the large family will once more be seen among our professional classes.

2. The second desideratum for selection is the existence of strong variations and sports; of persons who are unlike their fellows, who do things in their own way, who in some respects are eccentric, who embody a tendency to run counter to prevailing fashions. Here, it may be feared, that the action of education has in many cases been harmful; for it has often tended unduly to repress originality and independence. Our great boarding schools tend to turn out boys who resemble one another in general habits of mind to an amazing extent. The type is a good one, but it is uniform, and it may well be asked whether the State will not in the long run suffer from the disinclination of the carefully trained men of the upper classes to do anything, or to think anything, for which there is not already a precedent.

To this it may be replied that education has a twofold duty in this connexion. Its aim should be partly to make people like one another for the sake of unity and homogeneity in the State; for when communities struggle with one another it is the most homogeneous society that, other things being equal, will prevail; and partly to bring out to the greatest extent the essential differences that exist between man and man. The manner in which this should be done can only be glanced at;

for we are concerned not with the manner of encouraging individuality but with the reason for doing so; here it must suffice to say that wise opportunities for specialisation, the arrangement of school studies so that they give ample scope for the exercise of ingenuity and imagination, the abolition of uniform examinations for boys below a school leaving age of 16 or 17, and above all a complete absence of artificiality.

We have seen that like tends to marry like. This tendency is however not always found, for frequently there are circumstances that interfere with it, and among these is the frequent failure of education to bring out the essential characteristics of the individual, and to make it clear to himself and to the world at large what his strong points are. The result is that the strong variation, who in the interests of the heterogeneity of the society, should be wedded to a strong variation of a similar kind is swamped by the indifferent qualities of his mate, or at any rate does not breed true. It is here that a badly devised system of education may do disservice to eugenics. It may select a feeble characteristic and develop it in a spurious manner, so that its possessor gives the appearance of possessing it to a strong degree whereas he really does not. If then, as a result of this process, persons with the appearance of similar qualities are attracted to one another the following undesirable positions may arise. (1) A person with a true inborn quality which has been developed may be led to marry a person who has that quality only to a slight degree, but through education has been able to give it the appearance of strength. As a result the breeding will not be true, and if the possessor of the strong inborn quality is a strong variation in a good direction his marriage will be a disaster for the community, for his inborn quality will be swamped. (2) If both the persons have the quality only to a feeble extent and are brought together by the artificial enhancement of its external manifestation less harm is done, as no very strong quality will be swamped in the mating, and the couple and their offspring will tend to foster the appreciation of the quality in the community; but even here there is the danger that the quality in question may have been developed at the expense of some stronger inborn quality, and thus that

the general result of the process will be to increase the similarity rather than to accentuate the difference between individuals.

These remarks must draw to a close. They are but a skeleton outline of the points of contact between eugenics and educational theory. Many matters have had to be treated too briefly for their full force to be brought out; one, perhaps the most important, the education in the individual of the *will* to develop himself in the direction indicated by a good inborn tendency, has been wholly omitted, and here education is of paramount importance. But sufficient has been said to show how unjustified and unintelligent is the statement of the biologist that education cannot affect racial development and to indicate (1) that the educator, the thinker and the reformer by working upon social opinion until certain qualities are demanded imperatively and thereby acquire a survival value, may secure through selection the prominence in the community of persons with the qualities that they desire; (2) that by going for essential qualities and developing individuals on the lines of their own strong tendencies the growth and permanence in the society of strong variations may be fostered; (3) that it is in this indirect manner, rather than by the more direct methods now frequently suggested, that the eugenic improvement of society must be promoted.

THE PROBLEM OF DEAFNESS AND ITS PREVENTION.

By MACLEOD YEARSLEY.

THE medicine of the future is preventive, it is in the nature of progress that it should be so, and, as time goes on, every branch of medical science will partake more and more of a preventive character. That branch of the healing art which deals with the treatment of diseases of the ear and of the deafness which arises therefrom is of comparatively recent origin, and, during the last quarter of a century, has made great strides. Hitherto, however, it has dealt rather with bi-products. It has perfected the treatment of intracranial abscess, and the numerous other serious and often fatal complications which may arise during acute and chronic abscess in the ear, but too little attention has been paid to the great importance of prompt interference with their primary causes, although much valuable work has been done in the elucidation of such causes. With regard to the deafness which arises from non-suppurative forms of ear disease, the record of modern otology is less satisfactory. In spite of the fact that the causative factors of deafness are well known, little has been effected in the prevention of the terrible infirmity to which they lead, and many persons have been and still are allowed to progress to serious or complete deafness without adequate struggle to avert it. The means at the disposal of the surgeon for the relief of deafness are often wholly insufficient to alleviate and the sufferer has to be content with such artificial aids as trumpets, tubes, or lip-reading. The great majority of such cases are, as a matter of fact, eminently preventable, and there is no reason why deafness, as confidently asserted by Dr. Kerr Love, may not be made to pass away from our midst.

Deafness has been taken lying down by the profession and the laity for too many years. It is time that this was fully realised in order that the means for prevention, near to hand, are taken universally. According to the statistics of the Census for 1901—those for 1911 are not yet available—there are, in the

United Kingdom, 21,855 persons classified as "deaf and dumb," This takes no account whatever of the numbers who have become deaf in youth, young adult and later life. When it is realised what an enormous loss of otherwise serviceable citizens this means to the State, the argument for prevention will come home with greater force. The majority of specialists are fully aware of the direction in which the prevention of deafness lies, but it needs a great movement, in which the laity must take part, to give the necessary stimulus for prevention to be carried out. In order that this movement may be initiated, it is essential that the laity should be put into possession of the salient facts relating to deafness and its origin. These facts, once grasped, should arouse those previously ignorant of them to a sense of what is going on around them, and stimulate public men and responsible bodies to set going the machinery of efficient prevention.

Deafness may be divided into the congenital and acquired forms. Research has shown that, among the congenital cases, there are at least two classes, those in whom the condition appears sporadically and in whom no hereditary tendency can be detected, and those in whom a distinct hereditary tendency is to be found. Until recently both these groups have been confounded together, but, largely owing to the work of Dr. Kerr Love, they have been distinguished as entirely separate. The group of cases in which deafness occurs sporadically in families will need further classification, since it contains not a few instances in which the deafness was not congenital at all, but occurred at some period of infant life, usually before the second year (that is, before the acquisition of speech), from some acquired cause the nature of which was overlooked. It will be more convenient, therefore, to consider true hereditary deafness first.

By true hereditary deafness is meant that form of deaf-birth in which the condition makes its appearance in several members of a family, these members being found in successive generations and collateral branches, and it is not enough that they should occur merely in one generation, for it is possible that, where several brothers and sisters are born deaf, it is rather an

instance not of true hereditary deafness but of sporadic deaf birth, due to some such cause as syphilis. The application of the Mendelian theory to the problem of hereditary deafness is of considerable help and, with further research, there is no doubt that it will be found to be of still greater assistance. Mendel's law is now well known, but a short recapitulation of its chief points is necessary here. This is best given by quoting Bateson's summary that "The essential part of the discovery is the evidence that the germ cells or gametes produced by cross-bred organisms may in respect of given characters be of the pure parental types, and consequently incapable of transmitting the opposite characters; that when such pure similar gametes of opposite sexes are united in fertilisation, the individuals so formed and their posterity are free from all taint of the cross; that there may be, in short, perfect or almost perfect discontinuity between these germs in respect of one of each pair of opposite characters." This summarises Mendel's theoretical interpretation—the theory of gametic segregation—of the important set of facts which he discovered. Mendel assumed that the hybrid offspring of two pure-bred parents differing markedly as to a unit character, produce two kinds of germ-cells, one kind with the dominant character, the other kind with the recessive character. In other words, the gametes are segregated into two sets of "pure" gametes.

To illustrate the Mendelian hypothesis the simplest example that can be taken is the well-known experiment in the breeding of peas. The fertilisation of two individuals of tall peas will give a posterity of tall peas only, whilst the result with dwarf peas will be a posterity of dwarf plants only. If, however, a tall plant be crossed with a dwarf, the resulting first generation will all be tall. In the next generation, if the cross-bred plants be allowed to fertilise themselves, the offspring will show the two original forms, of which three will be tall and one dwarf. In this case, therefore, the "tallness" is "dominant" and the "dwarfness" is "recessive" and, in all cases of Mendelian crossing, it will be found that the results will show, on an average, three dominants to one recessive. In Mendel's original experiment, out of 1,064 plants, 787 were

tall, 227 were dwarf. When these recessive dwarfs are allowed to fertilise themselves, they give rise to recessives only, for any number of generations; that is to say, the recessive character breeds true. Of the dominants one-third are "pure" dominants, which, in subsequent generations, give rise to dominants only; and two-thirds are cross-bred dominants, which on self-fertilisation again give rise to a mixture of dominants and recessives in the proportion of three to one.

Without going further, it may be pointed out that the theory of Mendel furnishes an explanation of the fact that deaf-birth may appear in, formerly, unexpected fashion in families showing hereditary deafness. If no further fact were made patent than that the union of two hereditarily deaf persons may give rise to deaf born and hearing offspring and that the latter may carry in their germ-cells the (?) recessive character of deafness and so may, even if mated with hearing persons, give rise to further deaf-born children, that fact alone is of vast importance. In hereditary deafness, from the study of such imperfect family trees as we possess, hearing appears to be the dominant character, deafness the recessive, hence, in order that the number of hereditary deaf-born persons may be reduced it is important that those known to carry the recessive character should not be allowed to mate together, or that, if permitted to marry, they should only mate with hearing persons whose family histories are without taint of deafness.

In dealing with the prevention of true hereditary deafness, therefore, the questions to be considered are mainly social and educational. One must, however, go further, and point out that, amongst families showing hereditary deafness, there are those who show that defect alone and those who show it in conjunction with mental deficiency or imbecility or epilepsy. The latter class should be prohibited from marriage altogether, a prohibition which should include those members of the family who are apparently healthy, since they are likely to be carriers of the recessive characters. At the present state of our social evolution, it is difficult to interfere with apparently sound individuals and we must for the moment, be content—inadequate

as it may be—to use repressive measures with those who show the recessive character in their persons, feeling that, as more is known upon the subject and we can speak with more authority upon matters of heredity, we shall take more care in the breeding of our future citizens. With advanced and certain knowledge, the wider prohibition will be sure to prevail in the future. To this end it is important that the mentally defective and epileptic deaf should be segregated for the whole of their lives.

As regards those who exhibit hereditary deafness alone and uncomplicated, the matter is somewhat different and, possibly, capable of easier solution under present conditions. The segregation of the deaf in residential institutions and their acquisition of a language, that of signs, which can only be understood amongst themselves or by a limited number of hearing persons who pass their lives amongst them—certainly not by the outside community—is a grave defect in deaf education, for it is one which must lead inevitably to the intermarriage of deaf persons. What is required is that the deaf should associate more with hearing persons and less with one another, and that, by means of speech taught by the oral method and lip-reading, they should be able to communicate with their hearing fellows. To this end the day-school system and instruction by the oral method must be made more universal. There are persons, happily diminishing in number (as reactionaries generally do in the face of progress), who would make of the deaf a class apart. Such persons are doing a grievous wrong to the very class they believe they are benefiting, for they deprive the deaf of free intercourse with the hearing and force them to intermarry in their quest of sympathy and family life. Until these defects in the social welfare and education of the deaf are remedied, it is unfair to expect intermarriage between deaf-born persons not to take place.

Hitherto the occurrence of deaf-birth only in families in which similar cases have occurred in other generations has been discussed; but what of the appearance of a deaf-born child in a family, all the members of which have been hearing hitherto? Great light has been shed upon this question by the recent masterly research of Dr. Kerr Love. To him we owe a great

debt of gratitude for the disentangling of the very complex subject of sporadic congenital deafness. It will be found on investigation that nearly all the children in institutions for the deaf come from the poorest class of the community, those who live in a continual condition of dangerous overcrowding in their homes. The social status of the families from which come the deaf children of Glasgow—the city to which the researches of Dr. Kerr Love chiefly refer—is that of the single apartment home, and these show overcrowding to an appalling extent. This overcrowding means untreated syphilis, uncontrolled use (or rather abuse) of alcohol, carelessness in the upbringing of children. Consequently the child death-rate is high and there is a deaf-mute rate which is never approached in the houses of the well-to-do classes. This makes for an increase of sporadic congenital deafness and of cases of early deafness in childhood. The damage to hearing occurs before birth or during the first years of life, and the deafness which results is irreparable. Under such circumstances, and there is no reason to doubt that they prevail as much in London, Liverpool, and other large cities as in Glasgow, parental neglect is rife to an extent of which the ordinary person has no idea and, even if he has some inkling thereof, never fully realises. Indeed, it would appear that the parents care no more for their offspring once they are born. And yet it has been shown¹ that the children of the very poor are at birth physically quite equal to those of the well-to-do. Hence the position as to prevention lies to a large extent in solving the housing question. The matter cannot be put better than it has been by Dr. Kerr Love: "If deafness is to be prevented, there must be decent and healthy conditions for the children of the poor during the first years of life. Like a plant, or any young animal, they must have room to grow, they must have simple, clean, free conditions of life. This is the first step for the prevention of infantile or sporadic congenital deafness."

But there is something else in addition to the miserable conditions of the families from which the great majority of our deaf

¹ Kerr Love, four lectures on the Causes of and Prevention of Deafness. The National Bureau for promoting the general welfare of the deaf. P. 35.

children spring. Some workers at the subject have ventured to see in alcoholism the chief factor. But, even granting the effect of chronic alcoholism in the parents upon their germ cells, it is rather the conditions which lead to habitual alcoholic excess that account for the results in the children. It is the poverty and misery which lead to the excess and the consequent neglect of the children that must be attacked before the parents are lectured and preached to upon the sins of alcoholism and the benefits of total abstinence (misnamed "temperance"). How many of those who talk glibly upon the evils of intemperance realise the causes that lead thereto? It has been truly said that it is not possible to make men and women sober by Act of Parliament, but they can be weaned from their intemperance by making their homes brighter and more healthy and their conditions of life more bearable. Healthy men and women who have something to live for do not need the oblivion that drunkenness brings to blunt their senses and give them a brief respite from their misery. It is not right to look upon every case of alcoholism as a disease.

It is not in alcoholic excess alone that the additional factor in the solution of sporadic congenital deafness is to be found; some more potent agent must be sought. This agent has been shown by Dr. Kerr Love to lie in untreated syphilis and he has been the first to establish the fact, upon undeniable evidence, that congenital deafness is sometimes due to this disease. Syphilis is the only disease which causes deafness in both parent and child; it is at work both before and after birth and so forms a link between congenital and acquired deafness. From careful investigation, by means chiefly of the Wassermann blood-test, Dr. Kerr Love has been able to publish the histories of 21 families. In these families there were 172 pregnancies, which resulted in 30 miscarriages, and 112 live births. Among these there were 75 deaths (including the 30 premature births), nearly all of which occurred in the first or second years. Thirty-one children were deaf, or blind and deaf, and of the 66 remaining living children, many were born before the poison entered the parental blood. Many of the 66 are not healthy, and more are likely to become unhealthy, because the blood-test showed that

the poison was still present. "Nearly two-thirds of the children born are dead, or, if alive, are either deaf or blind or both (106 in 172), and with a few exceptions there are no adults in the families. In many of the families one or more deaths from meningitis have occurred." This is a fearful record for one city and it is more than probable that it is equalled or even surpassed in our other great cities. What an appalling waste of life, a waste eminently preventable. The sin of syphilis has been talked about with bated breath for years, but not the real sin of syphilis. That lies, not in its method of propagation, but in the way the disease has been regarded hitherto. The real sin of syphilis is not one of commission, but one of omission. Happily for humanity times are changing, and we are now discussing openly what formerly we only dared to think,—that the time has come, indeed it has been long overdue, when syphilis should be regarded as a disease and not as a secret sin. The present Royal Commission will have plenty of evidence before it to prove that this disease is one of the most fell enemies of social life, one that, properly handled, can be stamped out as smallpox has been eliminated, as tuberculosis is being eradicated. It is not an exaggeration to say that there is no disease more disastrous to child health, more destructive to child life, than is syphilis, not even tuberculosis. Yet it is not notifiable, and amongst the poor is scarcely ever treated. An infectious disease, due, like many other diseases which we deal with in a rational way, to a micro-organism, it enters the blood of the parents and is transmitted to their offspring. Children it stunts, dwarfs, kills. Many children thus tainted are still-born or die within a few months or during the first year, whilst of the survivors many become blind, deaf, or both. Many of the child deaths attributable to the disease occur from meningitis and it is by meningitis, when it does not end fatally, that it causes brain defects. Deafness may occur before birth, either from prenatal meningitis extending to the essential nervous apparatus of hearing, or by disease of that apparatus alone. Yet syphilis is a disease very amenable to treatment, and it is only because it is allowed to go untreated that it is transmitted to the child. It was long ago pointed out that the children who become deaf or blind are those in whom treatment was neglected in infancy.

Syphilis, as has already been pointed out, forms a link between congenital and acquired deafness. It has been proved to be a potent cause of sporadic deaf-birth, thus causing also mutism; it may, and frequently does, cause deafness after the speech habit has been formed, between the ages of 6 and 16. Many of these children present, with their damaged sight, damaged ears, deformed faces and often damaged brains, some of the most terrible object lessons that syphilis can give. These are cases for *prevention*, not for cure, and they alone would form sufficient reasons for saying that our present methods of regarding syphilis are disgraceful to a civilised and Christian country. The obvious, the only possible way in which syphilis, which probably causes more sporadic deaf-births than can at present be demonstrated, is to make notifiable every case of the disease, congenital or acquired, in order that mother and child may be reached with a view to prompt treatment. Public opinion is, happily, tending in this direction. At the recent International Congress of Medicine in London the consensus of opinion was overwhelmingly for notification. The Congress on Infant Mortality, held about the same time, expressed itself similarly and the writer of the present article was instrumental in obtaining a unanimous and strongly worded resolution to the same effect from the Association of Medical Officers of Health, and this was forwarded to the Local Government Board.

It is necessary, before leaving the subject of congenital deafness, to allude to the part played by consanguinity in deaf-birth. A great deal has been said as regards the possible influence of blood relationship as a factor in congenital deafness, and, from his researches,¹ the writer has found that, out of 309 families of congenitally deaf cases, cousin marriages occurred in 22, or 7·08%, whilst in 592 families of acquired deaf children, such relationship was present in only 2 cases, or 0·32%. It is undoubtedly true that a much higher proportion of consanguineous marriages is to be found in the family histories of congenitally deaf cases than among the normal population. In the United States, Fay² found that the percentage of deaf

¹ The causes leading to educational deafness in children. *Lancet*, July 20 and 27, 1912.

² Marriages of the deaf in America, Volta Bureau, Washington, 1898.

children born from marriages reported as consanguineous was nearly four times as great as from marriages not so reported. The reason probably lies, however, not so much in consanguinity *per se*, but rather in the question of stock. Arguing upon Mendelian lines, if the stock is good and free from the taint of deafness, there is no reason why the offspring of a consanguineous marriage should show deafness, because that recessive characteristic is not present. Whereas, if deafness should happen to be present as a family taint, the union of two blood relations, both of whom probably carry—although they may themselves be hearing—the recessive character in their germ cells, would be likely to accentuate it and recessive offspring would occur with a frequency which would follow the Mendelian hypothesis. They would, that is to say, act as impure dominants, giving rise to three dominants to one recessive, of which the recessives would breed true and of the three dominants, two would be impure.

Although the future is pregnant with possibilities for the prevention of true hereditary deafness and the way lies clearly marked out for the prevention of many cases of sporadic congenital deafness, it is in the domain of acquired deafness that preventive measures are likely first to meet with greater success. If such success could be achieved, the vast majority of cases of acquired deafness would pass from our midst in a comparatively short time, for the whole secret of the prevention of acquired deafness in adults lies in that of its prevention in the child. It is, therefore, here that a great field lies before the worker in preventive medicine, and there is no reason whatever that his efforts should not be crowned with a success as great as that in any other department of his profession and, moreover, success which should give him one of the greatest monuments in medical history. The present age is the dawn of preventive medicine, the air is thick with it and it will be the medical science of the future. The three duties of the physician are to prevent, to cure, and to alleviate. In the field of otology, however, these duties would seem hitherto to have been reversed and the aural surgeon has rather endeavoured to alleviate, to cure, and to prevent. The great majority of cases of adult

deafness cannot be cured, a number of them cannot be alleviated; nearly all of them can be prevented; it remains to be shown how this prevention could be carried into effect.

The three great groups of causes of acquired deafness are meningitis, the infective diseases, and primary ear disease. As an illustration of the relative number of cases under each heading may be taken the figures already published by the writer. Out of 845 instances of acquired deafness, of which the causes were definitely ascertainable, 723, or 85·2%, came under these three groups, the numbers and percentages being :—

Meningitis ..	169	or	23·5	per cent.
Infective diseases ..	343	"	47·4	" "
Primary ear disease ..	211	"	29·1	" "

723 100·0

Each of these requires to be discussed separately.

Meningitis is a more potent cause than even these figures would indicate, since among the cases arising from infective diseases, a considerable number are due to meningeal complications. Meningitis owns a multiplicity of causes, tubercle and syphilis among the number and, until its many forms and causes are worked out, the prevention of the deafness arising from it cannot adequately be proceeded with. Our present knowledge of meningitis is—save for the advantage gained by bacteriology—at about the stage of that of typhoid and typhus seventy years ago. Hence research is necessary in order that its varieties and causation may be elucidated. For the institution of such research it is important that every case should be controlled by notification, for purposes of isolation, investigation and treatment. This is one of the suggestions that have been put forward by the Medical Committee of the National Bureau for Promoting the General Welfare of the Deaf, a committee which has taken seriously in hand the whole question of the prevention of deafness. The importance of investigation into the causation of meningitis will readily be apparent when it is realised that this disease causes as many deaths as scarlet fever and measles together. In 1909, the deaths from meningitis were 11,118 and this total does not include over

10,000 deaths due to convulsions, many of which were certainly instances of meningitis, nor does it include deaths from meningitis in the course of such infective fevers as scarlet fever and measles. Here is another appalling waste of life that should engage the attention of legislators.

In the second group of causes—the Infective Diseases—are included such maladies as scarlet fever, diphtheria, measles, mumps, smallpox, whooping cough, tuberculosis, syphilis. The last-named disease has been already dealt with in some detail. Tuberculosis attacks the ear of infants and young children and may cause great destruction of the organ and so of its function. It is, however, a disease which tends to kill and the majority of children attacked die before school age. The prevention of deafness in this condition is, therefore, almost entirely a question of the prevention of tuberculosis generally, for the treatment of the ear complication is too often one in which function has to be sacrificed in the attempt to save life. Tuberculosis is one of those diseases the terrible nature of which has arrested public attention, with the result that it is slowly, but surely, being driven from our midst by modern methods of hygiene backed by legislation. If the same methods, aided by the flooding light of widely disseminated knowledge with which tuberculosis is being overwhelmed, were pursued in the case of syphilis, the latter disease would be shorn as easily of its terrors. Indeed, the desired result would, probably, be attained with greater rapidity and facility. Tuberculosis, considering the present active measures for its prevention, need not claim further attention in this article, since adequate means for the prevention of deafness are bound up in those for attacking the primary disease.

Of the other infective diseases, the infectious fevers, the greatest offenders are scarlet fever, diphtheria, and measles. Much has been done by isolation in preventing their incidence. As modern methods progress, they ought to be stamped out as surely as smallpox has been eradicated, or, when it does occur, bereft of its greatest terrors. But, unfortunately, the special treatment, during the actual attack of these diseases, of their ear complications has not been so satisfactory. Cases of scarlet

fever, diphtheria, and measles are often sent out of the fever hospitals before ear discharge has ceased. Often the discharge carries infection; Kerr Love has known such a case dismissed in the thirteenth week and has seen the brother of the child die of scarlet fever before the infected child was a week home from the hospital. Such an experience may not be a common one, but the persistence of ear discharge and the destruction of hearing is of common occurrence. The three diseases mentioned may cause deafness in one of three ways, by meningitis (in which case its prevention comes under that of the brain condition), by suppuration in the middle ear, or by catarrhal disease of the middle ear occurring later. It is the suppurative complication that requires most to be considered here. This form of ear disease is not only often infective, but it tends to remain, to destroy hearing and to kill. A fatal result may be delayed for years, but it is none the less sure. It is scarcely an exaggeration to say that more operations on the ear are necessitated by the serious brain and other complications of ear discharge following scarlet fever, diphtheria, and measles than in any other form. The time comes when the surgeon has to sacrifice function to save life; often the destruction wrought by the disease has already destroyed the greater part of the hearing. The proper treatment of these conditions is to prevent them when they threaten or to interfere promptly when they occur. Hence efficient treatment can only be carried out in the fever hospital itself. Such measures require a specialist, a fact that has been recognised by some medical officers of fever hospitals, by the British Medical Association, by the National Bureau, by the recent International Congress of Medicine, and by the Association of Medical Officers of Health, all of whom have pointed out the urgent necessity of adding aural surgeons to the staffs of fever hospitals for this purpose.

Lastly, there remains to speak of the prevention of acquired deafness due to primary ear disease. This problem is, again, largely bound up with the prevention of such deafness in the child. The majority of cases of deafness in young adults originates during childhood, it is, therefore, the child that must be dealt with. The medical inspection of school children, so

recently inaugurated, is doing much in this direction and will do still more when the treatment which is its ultimate aim is placed upon a more sure and more common-sense footing. But, for the work to be done efficiently, *it must be carried out by specialists*, who have the greater experience necessary to the end in view. School clinics and treatment centres for dealing with aural disease in children should be in charge of specialists or, failing that, under specialist supervision. There is no lack of competent men to do the work and they alone can do it efficiently. Middle ear deafness comprises about 80 or 90% of all forms of deafness and 90% of these cases owe their origin to inflammatory conditions in the post-nasal space, whence they extend to the ear by way of the eustachian tubes. The most frequent predisposing cause of middle ear disease thus induced is the condition of enlargement of the pharyngeal tonsil known as "adenoids," and systematic aural examination of adenoid children has demonstrated that a high percentage—probably 75%—has some ear involvement. Moreover, those who have studied the matter are convinced that many cases of middle ear deafness first noticed in adult life have their origin in inflammatory conditions of the post-nasal space, *dating from childhood*. Now, as has been already pointed out, the routine treatment of chronic catarrhal deafness leaves much to be desired. Hence the only sure way of reducing the number of cases of chronic deafness due to this cause is by prevention, and it is probable that in no other field of preventive medicine are there better opportunities than in the prevention of chronic middle ear catarrh and the progressive deafness which results therefrom. The sooner this is recognised by the medical profession generally and by the laity, the sooner will the terrible affliction of deafness pass away from our midst.

[Mr. Yearsley suggests that if hereditary deafness is a Mendelian recessive character, those known to carry this character, if they must marry, should be encouraged to marry hearing persons in whose family there is no taint of deafness. It is not clear that any eugenic advantage could be attained this way, as it would lead to the production of a large number of heterozygous persons with deafness latent in them, who in the not unlikely case of their intermarrying would provide some deaf mute children.]

CONSANGUINEOUS MARRIAGES.

By the late E. NETTLESHIP, F.R.S., F.R.C.S.¹

I TOLD our Secretary a few months ago,—rashly as I now find—that I would try to fill a gap at one of these meetings and suggested consanguinity of parents as a subject that might interest the audience and suit my possibilities. I regret to say that I have not been able to make adequate preparation and can only ask you to excuse shortcomings and to bear with me if I say some things that are perhaps as familiar to my audience as to myself. For I can neither treat the subject exhaustively nor say anything new and must be content to bring together a few leading facts, to cite a few examples and draw one or two tentative conclusions.

The subject of marriage between blood-relations should, I think, engage the attention of all who are interested in problems bearing upon the improvement of the race; it is at any rate one upon which there has been, and perhaps still is, much diversity of opinion. Such differences of view are doubtless often based, on the one hand, upon the experiences of certain single families where serious defects or degeneracies have appeared in the offspring of consanguineous marriages, and on the other upon acquaintance with families in which nothing undesirable has followed the marriage of first cousins. Indeed those who object, from what we may call individual or single-family experience, would perhaps be surprised to find that the children of cousins sometimes showed a decided improvement upon their parents. In short I venture to think that the subject is one upon which we may well seek more knowledge and greater clearness of thought.

The fundamental questions are (first) whether the offspring of consanguineous parents display inferior or degenerate characters in larger proportion than do the offspring of unrelated parents? And (secondly), if such an effect can be shown, is the appearance of these undesirable

¹ Read before the Haslemere Branch, Eugenics Education Society, October 31st, 1910.

characters attributable to something produced *de novo* by the union of parents related in blood, but who themselves contain no trace of such characters, either manifest or hidden? Or are the defects only a result of both parents being tainted, but not tainted badly enough to show?

The second question is not merely academic. For if consanguinity can produce something bad, good, or indifferent that had never occurred before in the genealogy then no cousin marriage is safe. But if it is only a case of inheritance from both parents, a tainted pair who have no community of blood will, so far as we know, be as likely to have undesirable offspring as if they were tainted cousins; whilst cousins who are free from taint will be expected to yield normal children.

It must be said at once that the data for answering the first question upon statistical grounds do not exist because no one up to the present time has been able to obtain sufficiently accurate returns of the relative numbers of consanguineous and unrelated marriages.

In 1862 a French writer, M. Boudin, came to the conclusion that close upon one per cent. of the marriages in France between the years 1853 and 1859 were between first cousins (counting in a few between uncle and niece or aunt and nephew). And he considered that if second-cousin marriages had been included the total percentage would be two per cent. This conclusion was based upon the official records of more than 20 million marriages. It is obvious that such a return would err, if at all, on the negative side; especially in a Catholic country such as France was then. In the Roman Catholic Church marriage between near cousins is forbidden unless an indulgence be obtained by payment; and obviously the liability to such an exaction would sometimes lead to concealment of cousinship. Somewhat later returns (up to 1875) showed a rather higher proportion (1·5 per cent.) of first-cousin marriages, the consequence, apparently, of instructions from head quarters to make the enquiries more thorough. Further, M. Legoyt (Chief of the Statistical Department for France, quoted by George Darwin), at about the same date, came to the conclusion that the true percentage of first-cousin marriages for the whole

of France was much higher than Boudin had supposed, viz., about three per cent.

In 1875 George Darwin published a long and careful paper upon "Marriages of First Cousins in England and their effects." In this memoir the author made the important point that in England and Wales cousin marriages are probably much more frequent, relatively, in the aristocracy than in the general population, and least frequent in London. He estimated that 3·5 per cent. of aristocratic marriages were between first cousins, but only 1·5 per cent. of all London marriages. The paper was the outcome of great labour and care, but the exact figures of the cousin marriages were admittedly open to revision.

In 1908 Professor Karl Pearson made a limited contribution to the subject. He found that of 1,600 members of the medical profession no less than 4·5 per cent. had married first cousins, and that if the lesser degrees of consanguinity were included the total was 7·5 per cent.

This 4·5 per cent. of first-cousin unions may be compared with Legoyt's estimate of about 3 per cent. for the whole of France, and George Darwin's 3·5 per cent. for the British aristocracy.

Pearson further, from an examination of the books of the hospital for sick children in London, found only 1·3 per cent. of cousin marriages of all degrees up to third cousins, recorded in the histories of 700 in-patients. This so far as it goes confirms George Darwin's conclusion that consanguineous marriage was relatively infrequent in London; but the family histories of these 700 hospital in-patients were probably far from complete in regard to the point and 1·3 per cent. is almost certainly too low.

From these discrepant, and avowedly incomplete, materials it seems probable that a class or clan or caste influence operates in certain cases to produce a high proportion of consanguineous marriages, and that therefore conclusions as to any effects of consanguinity, whether bad or good, drawn from a *mass* population would not necessarily apply to all the groups of which the population was composed. However this may be,

one certainly finds that in some individual genealogies cousins often marry, and in others seldom or never.

As to the second question: Are the defects sometimes observed in the offspring of consanguineous parents due to the consanguinity as such or on the other hand to both parents being tainted?

In regard to the *de novo* origin of defects in children of cousin parentage we find Charles Darwin¹ stating his belief as follows after having devoted much attention to the subject, "I hope to show in a future work that consanguinity by itself counts for nothing, but acts solely from related organisms having a similar constitution, and having been exposed in most cases to similar conditions"; and a recent authority, Professor J. Arthur Thomson,² of Aberdeen, considers that "the idea that there can be any objection to the marriage of two healthy cousins who happen to fall in love with one another is preposterous." Many similar, and also some, but I think a diminishing number of, opposing, opinions might be cited.

What then is the origin of the view, or at least the suspicion, held by many, that consanguineous unions are injurious as such?

Without going back to the very early history of marriage customs and prohibitions—a task I am not competent to undertake—it is I think enough to say that the early Christian Church appears to be chiefly responsible for the existing residue of prejudice against the marriage of cousins. The church put its ban upon consanguineous unions; at first in connexion with the cult of asceticism and celibacy, later because it was able by the sale of indulgences to make money by allowing consanguineous couples to break the Canonical rules for a consideration. That this was so is confirmed by the subsequent extension of the prohibitions to various affinities, or even accidental associations, between persons not related at all by blood.

Thus—to quote from Huth's "Marriage of Near Kin" (p. 122), (1887)—the council of Trent in the middle of the sixteenth century issued the monstrous declaration "that the

¹ Darwin. *Animals and Plants under Domestication*, II. 94. 1875.

² Thomson. *Heredity*. 1908. P. 392.

person baptized, his *parents*, *godparents*, and the *priest* who baptized him were as much inter-related as though they were relatives by blood to each other," so that, as the author continues, "no tolerably near relative of the priest could marry either the godrelations or relations of any child that priest had baptized"; and there is much more to the same effect. Without enquiring too closely as to whether such absurd regulations were always carried out we may, I think, safely agree with Mr. Huth when he says that "The prohibited degrees were far too useful to abolish."

Of course other causes have been and are still at work in both encouraging and discouraging consanguineous marriages. Any such influences as may possibly depend upon supposed social inconveniences or inexpediencies arising from these marriages are outside my purview. I think the most operative cause of such hostility to these unions as still exists is the confusion, already referred to, between *inheritance* of a defect from two *slightly* tainted, but apparently normal, parents and the supposed *creation* of an entirely new thing by union between those of related blood. Such confusion is only too natural, and all of us have, I daresay, fallen into the pit at times—certainly I have done so formerly. For instance, if amongst the children of a pair of seemingly normal cousins there should be some born deaf and dumb the calamity cannot be hidden from the friends, and, as casual enquiries about cause are seldom carried further back than the parental generation, as most of us have a fatal facility for stopping at the first plausible excuse, no surprise need be felt if the cousinship, as such, is blamed; although had enquiry been possible or been permitted, cases of the same malady would very likely have been discovered in ancestors or collaterals.

That consanguinity of parents repeated through many generations is compatible with the maintenance of a high standard of health and vigour (mental and bodily) is demonstrated by well-known instances.

Near the mouth of the river Loire, on the Atlantic coast of France, is the small Commune of Batz, situated on a peninsula that is almost shut off from the mainland by a salt-marsh, so

that the inhabitants have (or had prior to 1864 when the investigation now referred to was made) very little communication with the people of the mainland. The principal occupation is salt-making; and the inhabitants live an extremely simple life and crime is almost unknown. They have intermarried amongst themselves for, as it is put, "countless" generations. In 1864 M. Voisin, interested in the effects of consanguineous marriage, spent a month in personally examining the facts on the spot. Amongst the total population of the Commune, at that date 3,300, he found 46 marriages that he counted as consanguineous. He made no attempt to tabulate the marriages of very distant cousins but states that the great majority of the marriages were of that kind, *i.e.*, he found but few married couples who were not related by blood in some degree. To begin with, the fertility of the 46 marriages detailed as consanguineous was decidedly higher than the average fertility for the whole of France. Next, he failed to find amongst the entire population (3,300) a single case of any of the various diseases and defects that are always named as being supposed to result from consanguinity of parentage, and he describes the people themselves as healthy, robust and intelligent. The death-rate of those who grew up was very low and many of them lived to a great age. The infant mortality, however, was very high, chiefly from acute diseases of the chest and throat and especially "croup." It is of course possible that amongst these young children who succumbed to acute infantile diseases there were some who would have shown inferiorities or defects had they lived; but even if we grant that, it is difficult to believe that not one of the survivors would have suffered in some corresponding way. Nor does it seem likely that the acute diseases of childhood would have selected a specially large proportion of those who might afterwards have shown degeneracies.

A very similar account was given in 1885 of the small fishing village of Staithes between Whitby and Saltburn. And quite a number of almost identical cases are upon record.

Of course plenty of examples are to be found where an excessive proportion of diseased and degenerate *are* found

amongst the offspring of cousin-parents. But these prove no more than that if such degeneracies exist in the stock they may be transmitted.

That inbreeding, very much closer in degree and repeated far more often than anything in modern human society, does not necessarily lead to degeneracy but quite the contrary is shown by the history of modern breeds of domestic animals. For it is of course admitted, not only that the marvellous improvements effected during the last 150 years in the breeds of horses, oxen, sheep and pigs—to name only the more important kinds of live stock—have been reached by careful selection of the individuals possessing the characters desired; but that, as we are constantly told, the only way to secure and to fix such desirable characters is to carry out this crossing of near relations; *i.e.*, we are told that the desirable characters come as the result of crossing parents both of whom possess them in some degree. Doubtless the same parents sometimes also contain the rudiments of undesirable characters and degeneracies also, but such individuals will as far as possible not be used for breeding, and the production of the weaknesses they show will thus to a large extent be checked. It may therefore be asserted that the history of modern breeds of domesticated animals affords little, if any, support to the doctrine that marriages of blood-relations can produce qualities—good or bad—that are not represented at all in either parent.

There does however seem reason to believe that *fertility* is, or may be, diminished by *very* close in-breeding, repeated for several generations (Darwin. *Animals and Plants under Domestication*. II., 101, etc.); I mean, *e.g.*, by mating, say, brother (*a*) with sister (*b*), and subsequently the father (*a*) with their daughter (*d*), and again with her daughter (*e*) and so on or *vice versa* as to sex. It is further asserted that when such infertility has reached a dangerous degree it can often be counteracted, *i.e.*, the normal fertility of the race or species be restored by crossing with a non-related stock; or what appears still more strange, by crossing with a very distantly related member of the same stock,—one derived from another branch of the same stem but perhaps reared under somewhat different

conditions. We may perhaps take comfort from this and,—whilst fully admitting that what is true for some of the lower animals may not always be true for man, especially in regard to the higher and distinctively human attributes,—conclude provisionally that if it should ever be shown that human cousin marriages were less prolific than others this defect would most likely be neutralized by the next out-marriage.

Huth ("The Marriage of Near Kin," pp. 193-96), summing up the material then available (1887) as to the number of children born to parents who were blood-relations and to those that were unrelated, respectively, found that the consanguineous marriages appeared to be more fertile than the others; and although he thinks that, owing to unconscious selection on the part of some of the authors whose data he quotes, the statistics are not entirely trustworthy, the conclusion is that consanguineous unions have certainly not been proved to be less productive than others, and that the probabilities point to their being more so.

The only contribution I can make at the moment to this subject shows very little difference between the number of children born to parents who were, and were not, cousins respectively. The data relate to the chronic progressive eye-disease, Retinitis pigmentosa; the numbers are not nearly large enough for final conclusions, and the information on which they are based was sometimes unavoidably incomplete. But I give them for what they are worth. In 93 completed families of children (childships) the offspring of non-consanguineous parentage, containing cases of the disease just mentioned, there were 591 children, or 6·3 to each marriage (average). In 48 childships the offspring of consanguineous parentage (usually first cousinship) there were 259 children or an average of 5·5 to each marriage. The difference of fertility, such as it is, is against the cousin marriages, but as already stated we could not safely draw conclusions from such a small series, even if it were certain that consanguinity had been recorded in every instance where it had been present.

I think, therefore, we may conclude that marriages between cousins are as safe from the eugenic point of view as any other marriages, provided the parents and stock are sound.

The difficulty, of course, both for consanguineous and out-marriages is to decide upon this vital point; and as for obvious reasons the family history is more likely to be forthcoming for a pair of cousins than for an unrelated pair, we have here a part explanation of the aversion to cousin marriage met with in some families. This explanation will tell with special force if the disease or defect is relatively rare for then it will be more likely to occur, though in a latent form, in two cousins than in two strangers. But if the defect apprehended be a frequent one, e.g., tubercle, the chances of the hereditary liability to it¹ being present in both parents and intensified in their children may be much the same whether the parents were cousins or not.

It seems to me that since we as yet know next to nothing of how the various transmissible characters, good, bad or indifferent, are, or at least may be, linked together in inheritance; and that there are many other factors in marriage beyond those relating directly to race improvement or the reverse; it is best, in the present state of our information, not to discourage marriage between cousins unless there be a clear case; e.g., inferiority or instability of a definite kind, or the history in the stock of such distinct diseases, or liabilities to them, as the eye disease, Retinitis pigmentosa (illustrated in Figs. I. and II.), or deaf-mutism and others, more familiar to us, that could be named.

It is I quite admit difficult at first not to believe that consanguinity as such may have the power of producing qualities, bad or good entirely anew, when we see in a large pedigree only a single member showing some pronounced defect, and that member the child of first cousins. Such a pedigree shown in *A Monograph on Albinism in Man* (Atlas, Part IV., Plate XIX., Fig. 137) where a single case of albinism is seen amongst three children of a marriage of first cousins. It will be noticed that other first-cousin marriages occur in this pedigree, but in a different branch, and that their children were all normal. Such cases—and they are met with from time to time in other conditions than albinism—can be readily explained on the supposition, Mendelian or other, that the

¹ I assume that the liability to tubercle is hereditary; there is, I know, some difference of opinion on this point amongst those best able to judge.

defect, which will probably be one of an infrequent sort, is, as already pointed out, more likely to occur in a latent or undeveloped form in two cousins than in two strangers. It is probable that albinism had occurred in an earlier generation of this genealogy, for we know from other instances that this peculiar deficiency of pigment may disappear for several generations and then emerge again, and you will see that only two generations above the albino are recorded with anything like completeness.

Diagram I., illustrates the occurrence of the same hereditary disease (a form of chronic failure of the sight) in the offspring of a pair of cousins and of an unrelated husband and wife, in the same pedigree.

Diagram II. shows how fallacious an enquiry may be if limited to the direct descendants of the affected person. The disease is the same as in Diagram I., and might have been attributed to the close consanguinity of the, apparently normal, parents (uncle and niece) had investigation not proved that a collateral, viz., a sister of the patient's mother, was also affected.

DIAGRAMS.

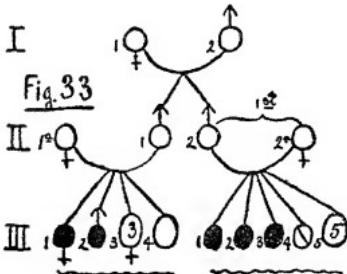


Diagram I.

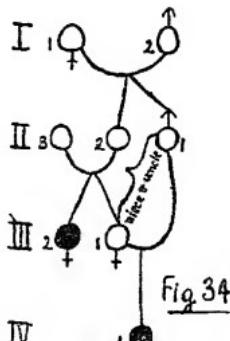


Diagram II.

I. A pedigree showing a disease (Retinitis pigmentosa) in two different childships, one the offspring of consanguineous parentage, the other not. (Ret. pigmsa. paper, Part I., p. 55, Fig. 33) (Webster's Case).

II. Shows the same point as I. in another way. (Ibid: Fig. 34) Rousseau's Case.)

THE MEASUREMENT OF INTELLIGENCE BY THE BINET TESTS.

By CYRIL BURT.

PART II.

(Continued from Vol. VI., No. 1, p. 36.)

HITHERTO we have been concerned with the object of the Binet scale. We have seen that Binet aimed at determining the normal course of the development of intelligence and at measuring individual differences in developmental terms. We have examined his conception of intelligence and his conception of mental development. We have inferred that, from the very nature of these conceptions, his scheme could only fulfil his aims in a very tentative and limited way.

We may now turn to consider the actual achievements of the scale; and examine with what success these aims have actually met. The results obtained by different investigators will, I think, when examined side by side, confirm our previous inferences.

(1) We will examine, first of all, the success with which the scale of tests has been arranged. It will be remembered that one of the striking features of the Binet system is the adoption of what I have called the principle of external gradation. Each test is not chosen so as to provide, of its own intrinsic nature, a graded scale of units inherent in itself. Rather, each test is itself a unit; and each marks a single point in an ascending scale. Thus, "the scale is composed of a series of tests, increasing in difficulty, commencing on the one hand at the lowest intellectual level that can be observed, and reaching at the other

that of an average and normal level."¹ In table III. of his last article, Binet has "arranged the tests according to their difficulty, the more easy being placed before the more difficult, and the degree of difficulty being indicated by the figures given. . . . This table (he adds) is to be retained to judge the results obtained by other observers ; it is a norm."² A study of the table shows that Binet's own results do not quite correspond with the order given. According to the figures, the test of "definition superior to use" is passed by only 23 children out of 40 ; yet it is placed before three other tests passed by 29 or 30 children out of 40, and indeed by more children at every age except one. Here, therefore, Binet seems to have determined the relative ease of the tests upon a priori grounds. The discrepancy he apparently would regard as merely analogous to "the discrepancy between a theoretical curve and an experimental one." Other observers' orders show wider deviations still. Their figures are seldom given in a form which allow of close comparisons. So far, however, as I can calculate, the correlations between the arrangements suggested by other investigations and that of Binet range from about '9 to about '7. The discrepancies shown by some of the tests are considerable. On rearranging the tests in order of difficulty according to results obtained in London schools, the test of the "divided oblong," which is the fourteenth test in Binet's list, appears as twenty-fifth ; "colour-naming," which is treated as a much harder test, and is placed twenty-fourth in Binet's list, appears as only sixteenth. There is a yet more serious difficulty. However accurately we make our calibration, it appears that the order of difficulty for normals will never be the same as that for defectives. Thus, normal children apparently come to define objects in terms of use a year before they can count thirteen pennies ; with defectives the reverse appears to be the case. Defectives are disproportionately backward in comparing objects, arranging weights, describing pictures and counting in reverse order. With epileptics the arrangement has still further to be revised. In

¹ *L'Année Psychologique*, 1905, p. 194.

² *L'Année Psychologique*, 1911, p. 153.

the tests involving weight-discrimination, memory, motor response, and rapidity of thought epileptics are unusually handicapped.

What then are we to do when the fixed points upon our scale vary from observer to observer, and become interchanged as we pass from normals to defectives and epileptics?

(2) But, perhaps, in demanding that the order of different observers' arrangements should be identical as regards each single test, we are demanding too much. We should merely require that the several groups of tests should be invariably assigned to the same mental age. Let us, therefore, see how successful Binet has been in discovering the age at which each test should be passed.

Binet suggested two criteria for verifying the correct allotment of the tests to their respective ages, neither being very rigid. His first requirement is that the number of children shown by the tests to be backward shall be equal to the number shown to be forward. The results of Binet and others only conform to this requirement if we mass the results obtained from children of all ages together; but even at its best the conformity is not strict. In Binet's results, out of 264 children, 72 are below the age and only 63 above. In Goddard's results, out of 1,547 children, 599 are below age and only 394 above. So far both results suggest that, if anything, the tests are a little too hard. Let us turn from the classical investigations of France and America to less known researches in Italy and Russia. Of 144 normal children from a kindergarten and State schools of a thickly populated part of Rome, only 17% are below age and over half, namely 54%, are above age. Yet, of 187 normal workmen's children attending State schools in Moscow, none are above age, and 73% are below; of the most capable children 3% were found to be two years behindhand, and, therefore, according to Binet would fall under an extremely strong suspicion of feeble-mindedness. Tested by the criterion proposed, the original standardisation of such a scale plainly has only a very local value; quite apart from the impossibility of finding equivalent translations for the questions and equivalent values for the coins, the simple transference of a scheme

devised for children of Parisian labouring classes to examine children of English elementary schools would be actually misleading unless the scheme is first re-standardised for differences of race and again re-standardised for differences of sex and social class.¹

Meanwhile, we must note that the criterion proposed for testing the standardization itself calls for preliminary study. As used by Binet and his followers it is open to at least two objections. First, the criterion clearly assumes a "normal," or, at any rate, a symmetrical distribution of ability. This is an assumption which most urgently calls for investigation; at present, apart from the general convenience of the assumption, the grounds for its acceptance are extremely scanty. At least one psychologist of note, Professor Cattell, has maintained the contrary. After pointing out that, in schools and colleges, selection would tend to yield a curve of distribution skewed in the negative direction, he writes: "In spite of this factor, I believe that the main skew is in the opposite (positive) direction; and that ability is distributed something like wages which are roughly proportional to it." In crude language, dullards outnumber geniuses, just as paupers outnumber millionaires. If this belief be true, then the results of Binet and Goddard are sound; but the criterion which seems to indicate their unsoundness is itself unsound.

There is a second objection to the common mode of applying this criterion. Piling together all the ages obscures the very fact we want to know. How accurately are the tests assigned to *each age*? Calculate the number above and below age separately; and then an approximation to symmetry is the exception rather than the rule. Terman and Childs have

¹ A curious instance of racial or social differences is afforded by the list of contradictory statements prescribed for the detection of absurdities. Binet's series (relating to a trivial railway accident with 48 killed, the mutilated corpse of a supposed suicide, the choice of a luckier day than Friday for killing oneself) were found rather blood-curdling by Whipple, and accordingly replaced. Binet protests. "Il paraît que ces histoires semblent effrayantes aux jeunes Américains. Nos jeunes Parisiens en ont ri."

According to the most recent investigations (J. and R. Weintrob, "The Influence of Environment upon Mental Ability as Shown by the Binet and Simon tests," *Journal of Educational Psychology*, 1912, p. 576), the effect of difference in social class appears to be small. In any case, it may well be due to differences in hereditary mental ability. I do not, therefore, press this oft-exploited argument against the scale.

done this. They find that the tests are far too easy for the earlier ages, and far too hard for the later. Out of 83 five-year-old children, only one is below age; 77 are above. Out of 35 twelve-year-old children, 32 are below age and none are above. Similar results have been repeatedly observed. Clearly, by adding the figures for all ages together such inequalities hide and compensate for one another.

Binet, however, hints at another criterion. Namely, a test is too easy for a given age, if nearly all can perform it; it is too hard if nearly half fail. His statements, however, of his grounds for allotting each test to the ages chosen are extremely vague:¹ once more we are left with the impression that the scheme was first drawn up in the study on the basis of clever guesswork and rough trials, and corrected and re-corrected in the light of subsequent experience. Later investigators have realized the need for a more exact formulation of the criterion. Some investigators require each test to be passed by two-thirds of the children of the age to which it is to be assigned²; others by rather over a half³; others again, by nearly all.⁴ Seventy-five per cent. is perhaps the only figure that has more than one supporter. Assuming normal distribution, it has been suggested that half of a given group (that is, all within the limits of the probable error) might be supposed to have medium or "average" ability; and that, of the remaining half, one-half again would be above "average," and one-half below. All those of "average" or above "average" ability should be required to pass the test, that is, in all, three-quarters of the entire group. At present, these suggestions, however plausible, have very little basis in experimentally ascertained fact.

Let us for the moment accept this arbitrary criterion. Let us compare the ages indicated for each test in the half dozen

¹ In the articles his phrases are: "all the children" . . . or "almost all the children could do this test"; or again, "this test was passed by the majority of the children of this age." In a letter to Dr. Bobertag, he states that "a test may be assigned to a given age if only 65 per cent. succeeded; . . . if 90 per cent. succeed it is perhaps too easy."

² Terman and Childs. These writers, however, propose to modify their criticisms in cases where there is a sudden rise in successes obtained in passing from one year to the next or where there is a similar proportion of successes in several successive years.

³ Pearson and Jaederholm calculate that in particular cases the solutions by children of the right age, according to a rearranged scale, were only 55 per cent.

⁴ The requirement of Goddard and his followers is 75 per cent. or more.

most important investigations with the scale. In every case the age chosen is to be that at which 75% of a group of normal children pass the test. The discrepancies are amazing. For not one test is there complete agreement as to the age to which it should be assigned. Among the forty tests, the commonest result, occurring in some fourteen cases, is for a test to be assigned now to the same age as Binet's, now to the next above, and now to the next below—thus fluctuating over a range of three years. In only seven cases is the range limited to two years. Twelve tests vary over a range of four years; six over a range of five years; two over a range of six years.¹ And yet a child who varies by two years or more from the normal age as given by the tests is, according to the scheme, under a grave suspicion of mental deficiency!

(3) Let us, however, assume that by dint of extensive investigations upon normal children, the several tests have been accurately assigned to their respective ages; and that the scale has, therefore, been properly standardized and fixed. How successfully will it enable us to measure the degree of intelligence possessed by any given child?

Three methods have been proposed. First, we may calculate his "absolute mental age." To do this, it would seem sufficient to carry him up the scale as far as he can go, and then give the age corresponding to the last group of tests which he passes with complete or almost complete success. This plan, however, Binet eventually modified. A child does not break down at one definite point; his failures may be spread over a series of mental years. Hence, Binet's final suggestion was to take the last age at which the child passes all the tests successfully, and then add on a fifth of a year for every further test passed beyond that point. Other writers have suggested that we should also deduct a fifth of a year for failures committed

¹ The table published by Meumann, *loc. cit.*, Vol. II, p. 276, gives one test (problem-questions) as extending over a range of seven years, being assigned to the age of 15 by Binet, and to the age of 9 by Goddard. The 9, however, seems to be an error. The statements in the text are based on figures compiled not by myself, but by an American reviewer (J. C. Bell, *Journal of Educational Psychology*, Vol. III., p. 104-5). His statement that "there is a surprising agreement in the results of the different investigators" is sufficient to acquit him of bias against the Binet scale.

before that point; others, that we should weight the tests to be added according to their difficulty.¹

As Binet remarks, his final mode of calculation permits us to measure the mental age even to fractions of a year: but the fractions "do not deserve an absolute confidence." For the classification of mental defects he suggests the following plan. Debiles or feeble-minded children are those who can read and write, but cannot achieve complex or abstract thought; they, therefore, are said to correspond to a mental age of five to nine. Imbeciles possess the use of speech, but cannot communicate by means of reading or writing; they, therefore, are said to correspond to the mental age of two to five. Idiots do not possess the use of language; and they, therefore, have a mental age below that of the normal child of two.

We cannot, however, class a child of eight as feeble-minded because he cannot perform the tests assigned to the age of nine. Binet, therefore, suggested a second form of measurement, that of "mental retardation." The child's mental age is subtracted from his physical age, and the remainder measures his degree of backwardness. A child who is three years behind the normal standard of his age is considered mentally defective; a child who is two years behindhand falls under extremely strong suspicion of feeble-mindedness; a retardation of but one year has, in this respect, little or no significance. To these proposals there are several objections. First, a child's chronological age is by no means the simple unambiguous measure it at first sight appears. By "aged 7" one investigator means from 7 to $7\frac{1}{2}$ years inclusive; another means between $6\frac{1}{2}$ and $7\frac{1}{2}$ years; another means from 6 to $6\frac{1}{2}$ years; yet another

¹ The importance of these suggestions will become obvious on considering the following scores, each of which yields the same mental age according to the usual method of reckoning. (x indicates success; o, failure.)

Child.

Tests for

	Age VII.	Age VIII.	Age IX.	Age X.	Age XI.
A. B.	1 0 0 0 0	1 1 1 1 1	1 1 1 0 0	0 0 0 0 0	0 0 0 0 0
C. D.	1 1 1 1 1	1 1 1 1 1	1 1 1 0 0	0 0 0 0 0	0 0 0 0 0
E. F.	1 1 1 1 1	1 1 1 1 1	1 0 0 0 0	0 0 0 0 1	0 0 0 0 1

Scores inclining to types A. B. and E. F. are especially common among epileptics; C.D. is always rare.

from $6\frac{1}{2}$ to $7\frac{2}{3}$ years inclusive. It is not at all uncommon, especially in the case of backward and defective children to find that the age borne by them throughout school life apparently alters when the time for leaving draws near or when a birth certificate has been produced. In many ways it would be far preferable to use some verifiable measure of physical age, more immediately related to physical growth, such as height, or degree of ossification of cartilage (Rotch's improved X-ray method); or (were it practicable) degree of pubescent or pubertal change. Disparity between mental age and physiological age is far more significant than disparity between mental age and chronological. Secondly, a large proportion of children diagnosed upon other grounds as mentally deficient prove to have only slight degrees of retardation. Out of 236 children in a German special school, 88 were either "normal" or backward by only one year according to the 1908 scale. None, however, have a mental age of over 9. Similar results have recently been obtained in English special schools. Finally, Binet has not after all been successful in finding a measure which is independent of age. A retardation of two years is commonly described as though it meant the same thing at any age of life. But clearly a retardation of six years at 30 would not have the gravity it possessed at 13; at 3 it would, from its nature, be unobtainable. In all special schools that have been investigated the older children generally show a larger retardation: in an English school I find that there is a correlation of .43 between retardation and chronological age. In considering retardation, therefore, we have to take into account the chronological age just as in considering the absolute mental age. Proper allowance could only be made by the method of correlation: by calculating, for instance, from experimental data obtained with a large group of defectives the regression of mental retardation upon their chronological age, and then correcting in the usual way. So far as I am aware this has never been done.

A third measure has, however, been proposed by Professor Stern, the "intellectual quotient." Here the mental age is divided by the physical age, instead of being subtracted from it.

We thus have an estimate of the proportion of the amount of intelligence a child has to the amount of intelligence he ought to have. If this falls below four-fifths, *i.e.*, 0·8 (corresponding to a retardation of one year at the age of 5 and of three years at the age of 15), then, it is supposed, we have evidence of mental deficiency. But even this measure has been found to be dependent in part upon absolute age; indeed, after the age of 20 even a normal individual's intellectual quotient must grow rapidly smaller. And the few investigators who have tried this mode of measurement have not met with great success.¹

From the nature of these proposals it must be clear that further topic calls urgently for investigation. It is not sufficient to know the general course of mental development of normal children : we need also to know the course of mental development among defectives. Does it consist of a temporary arrest followed by an advance at the normal rate? Or of a normal advance followed by a premature arrest? Does it consist in a rate of advance slower than normal throughout? Or in a rapider onset of the gradual decline in rate? Or, finally, are different courses followed by different forms of defect? Until these questions are investigated, it is impossible to decide upon general grounds between intellectual quotient, degree of retardation, absolute mental age, or any other method proposed for measuring the degree of a defective's development in relation to normal child's development at the same age.

In conclusion, let us take these methods of estimating of individual intelligence simply as arbitrary measures, and consider their empirical value upon merely practical grounds. Without enquiring into their validity let us compare them directly with the only other measure we have—namely, the subjective estimate of a careful and conscientious daily observer. In short, let us calculate, for a given group of children, the correlation between the teachers' ranking for intelligence and the order of intelligence yielded by the tests. Curiously enough, this has hardly ever been done. In a school of about a hundred defectives, I find that the correlation of the teachers' estimates with absolute mental age is .55; with mental retarda-

¹ Jennings and Hallock, "The Binet-Simon Tests at the George Junior Republic," *Journal of Educational Psychology*, 1913, p. 8.

son, 5c with intellectual quotient, .48. Almost the only other calculations of this relationship, with which I am acquainted, are those obtained from normal children in Scotland by Dr. McIntyre and Miss Rogers. In the abstract of a paper read before the psychological subsection of the British Association (Birmingham, 1913), they state that "the indices of correlation range from .35 to .16, the majority being about .5."¹ Now, internally graded tests which give no higher correlation with imputed intelligence than .5 are, as a rule, at once rejected, as no tests of intelligence at all. A simple test of some "higher mental process," taking from two to five minutes, for instance the "opposites," "analogies," or Ebbinghaus' "completion" tests, usually gives after two applications only, correlations of about .7 or .8. A combination of several such internally graded tests will give a more satisfactory order still.²

Tested, therefore, both in theory and in practice, the Binet scale proves far less satisfactory than is commonly claimed. The limited and tentative character of his schemes Binet repeatedly emphasized. Many of the difficulties urged he himself foresaw. It is not his work that I criticise. It is rather the current tendency to take his work, against his express injunctions, as a final and finished product that I deprecate. As a provisional but practicable plan for testing mental deficiency, as a rough but intelligible method of interpreting the results, as a pioneer investigation of the general course of mental development, as a demonstration of the richness of the higher, more complex, and more ordinary mental processes, as a protest against the mere examination of acuity of sensation, of speed of reaction, or of anatomical peculiarities, as a means of interesting the teacher, the doctor, and the social worker in the measurement of psycho-

¹ Mr. Dumville has recently obtained from a small normal group a correlation of a similar order, viz., "According to Spearman's foot-rule, '43, or translated into Pearson's coefficient, '62." (*Journal of Experimental Pedagogy*, Vol. 2, No. 2.)

² Cf., e.g., Vickers and Wyatt, "Grading by Mental Tests," *Journal of Experimental Pedagogy*, Dec., 1913. Unfortunately, no satisfactory tests of higher mental processes, applicable to very young children or defectives have as yet been published. I have, however, obtained fairly promising results with complex "substitution" and "erasure" tests, after first modifying them so as to use more interesting material—figures of little men and animals instead of the usual letters and geometrical forms.

logical capacities by psychological devices, as a prolific source of inspiration and suggestion, and, finally, as a stimulus to scientific discussion and enquiry, in these and many other ways the Binet scheme remains a marvel and a masterpiece. But every work of genius calls for later readjustments before it can be exploited as a practical instrument. Binet himself was always the first to modify his plan in the light of other investigators' research.

The most recent work has, I fancy, indicated modifications, perhaps more drastic than even he anticipated. Two surrenders will, I think, have to be made.

First, for all exact and scientific purposes, the principle of external gradation, of constructing a scale out of a long list of heterogeneous tests arranged in order of their relative difficulty, will have to be given up. Within the limits contemplated it seems impossible to find an order of difficulty which shall be the same for all. Further, the plan of "one test one point" throws open the door to chance. All Binet's tests were alternative tests : the child either succeeds or fails. Consequently, either he or the examiner is faced with a dilemma—the one situation in a psychological experiment which most invites the play of chance. The child is asked : "Which is your right hand?" "Is it morning or afternoon?" A correct response may be due to a blind choice of the first alternative that occurred almost as often as to genuine knowledge. Or, again, the child copies a square or a diamond; and the examiner has to decide whether it is a fair reproduction or not. Such decisions are bound to be arbitrary and unreliable. Where a time limit of 6, 10, or more seconds is allotted, and the child is failed if he takes longer than the prescribed allowance, the results in borderline cases are apt to be more irregular and haphazard still. Each test, therefore, must be made to provide its own scale. The measure must be, not simply failure or success, but so many problems correctly solved within the given time, or so many seconds taken to complete the task. The actual number might well be registered mechanically by the use of more ingenious apparatus; and the whole performance be rendered more independent of the power of examiner and examinee to understand instructions.

Secondly, we must discard the principle of measuring intelligence in terms of age. Each mental capacity should be measured in units of its own. These may be, first, the natural and original units of the test, expressed in seconds, marks, or other convenient form. For a rough illustration of their significance we may relate the measure thus obtained with the nearest age-norm. But it cannot be expected that it will coincide precisely with the average for a given year, or much less for fifth of a year. Better still, we may convert the original measurements into terms of the variability of the group. The mean for the corresponding age may then be taken as zero, and the probable error or standard deviation may be used as unit. We can then estimate at once the probable frequency of any given measurement or the likelihood of its occurring in a normal population of a given size; and the units in various parts of the scale will be far more nearly equivalent. Finally, by the aid of yet further calculations, based upon correlation, we may devise an index which shall measure general intelligence independently of age or of the nature of the tests employed.

The simplicity of these calculations is perhaps worth illustrating. Suppose we desire to determine the most probable measure of the intelligence of a child whose performance at a given test is 14. We may assume the following constants to be known: $r = .6$ represents the correlation between the test and intelligence; $\bar{x} = 20$ represents the average performance of the child's group at the given test; with $\sigma_x = 4$ as standard deviation; $\bar{y} = 30$ represents the average measure of the intelligence of the group; with $\sigma_y = 7$ as standard deviation. Then, the measure required, the measure of the child's intelligence is given by the usual formula, $y - \bar{y} = r \frac{\sigma_y}{\sigma_x} (x - \bar{x})$.

Substituting the known values, $y - 30 = .6 \times \frac{7}{4} (14 - 20)$; and, therefore, $y = 23.7$. This value, however, is only true within certain limits; but even these limits can be determined. The value is really the average of an array of possible values, whose standard deviation $S_y = \sigma_y \sqrt{1 - r^2} = 7 \sqrt{1 - (.6)^2} = 5.6$.

So far we are upon recognised ground.¹ Following Binet's repeated injunctions, however, we shall use not one test, but several; let us say, for simplicity, three. Here I would propose to apply regression equations calculated by means of the formulae for multiple correlation. The equations will be of the form

$$x_1 = 0.127 x_2 + 0.587 x_3 + 0.034 x_4$$

where x represents the most probable value of the intelligence of a child, whose performances or marks at three tests are x_2, x_3, x_4 . The constants by which the marks are multiplied are determined from the partial correlations between intelligence and the tests. Thus, $0.127 = b_{12.34} = r_{12.34} \frac{\sigma_{1.234}}{\sigma_{2.34}} = 0.68 \frac{.917}{.492}$ where, $r_{12.34}$ is the partial co-relation between intelligence (1) and a given test (2) with the other tests (3, 4) constant. This in turn can be determined from the original total correlations between intelligence and first test ($r_{12} = .49$), first test and second test ($r_{23} = .15$) and so on.

¹ I have taken this instance with some modification from W. Brown, *Essentials of Mental Measurement*, p. 46.

Using three simple tests, "Finding Opposites" (O), "Completing Syllogisms" (S), and "Completing Argument" (A), and estimating both Intelligence (I) and test-performance in terms of ranks for convenience, I have obtained the following equation from a group of 60 normal children :

$$I = .60(A) + .23(O) + .17(S).$$

Judged by teachers' estimates of intelligence, this furnishes a far better measure of intelligence than either the best test taken alone, or the average of all three unweighted. When amalgamated by this procedure three or four of the best Binet tests give far better results than ten or fifteen when amalgamated on the principle of each test to count the same. But the determination of such equations calls for much further research.

This, or something analogous, is, in my judgment, the only way to obtain a single measure of general intelligence from a variety of tests. We should constantly apply such statistical methods to the returns of the Census or of the Board of Trade; yet in the case of mental ability or defect we are content with raw and uncorrected estimates. In any case, correlation is essential to indicate kinds of tests most closely related to intelligence, to select the forms of those tests which are most reliable and self-consistent, and, finally, to solve the more fundamental and prior problems as to the nature of general intelligence and of the various specific mental capacities.

Last of all, it has become increasingly clear that we need not one, but several scales, each carried not merely to the age of thirteen, but extended through puberty and adolescence to the cessation of mental growth. The tests of scholastic attainment, the tests of general knowledge, the tests of emotional and moral character must not, as in the Binet schemes, be mixed with the tests of intelligence and other simpler psychical capacities. Further, the tests of the several specific capacities must be kept distinct from each other. Each has its own development; and each must have its own independent scale. Binet himself has drawn up a scale for testing general knowledge. Thorndike, Ayres, and Courtis, in America, have drawn up scales for measuring scholastic abilities—handwriting, arithmetic, and literary composition. In the work of Freud and Jung we have the beginnings of a scheme of emotional and moral tests. It remains for English investigators to complete the list. Along these lines only can we hope to do justice to the incredible variety both of mental ability and of mental defect.

NOTES AND COMMENTS.

The Scientific Study of Man.—The science of eugenics lives and grows by a beneficent parasitism on studies organized for purposes other than its own. In particular it should search for and eagerly absorb any knowledge which would facilitate intra-racial classification according to natural qualities. We welcome therefore the establishment of the "Institut Buls-Tempels" which was opened at Brussels on January 20th. Although it is primarily a school of pedagogy, yet, if its ends are achieved, it will undoubtedly contribute knowledge of which we stand in need. This it will do directly by organising experimental researches, having for their object an understanding of the child and indirectly be training teachers capable of carrying out such researches. A course of instruction to last for two years has been arranged. In the first year lectures will be given on embryology and heredity by Dr. Paul Heger, director of the Solvay Physiological Institute. He will deal particularly with the inheritance of instincts, normal psychological inheritance and the inheritance of disease. Dr. Victor Pechere will lecture on the physiology of the child. The laws of growth and the technique of anthropometry will receive particular attention. General psychology will be treated from its experimental side by Professor Ley, and Dr Henrotin will discuss, under the heading of Puericulture, such subjects as infant mortality and the nutrition of the new-born child. Instruction in school hygiene, including under this heading sex education, will be given by Dr. Ensch, and Dr. Croly will lecture on psychogenesis or the psychology of the growing child. His lectures fall into two groups, of which one treats the subject of mental tests in theory and practice.

Knowledge of the utmost value to the eugenist would also be likely to accrue if the propaganda of Mr. Arthur MacDonald attain results commensurate with the energy displayed in making them public. He has, for example, addressed a letter to the Home Secretary urging the importance of the proper

study of the criminal, and making practical suggestions how this may be done without incurring a great deal of expense. He proposes that the inmates of penal and reformatory institutions should be studied in each country by young men with medical, psychological and anthropological training. The work should be international in character, and done in each country in a uniform way in order that comparable results might be obtained. We have received from Mr. MacDonald a copy of this letter, together with another addressed to University students, in which he points out the importance of studying the criminal pauper and defective classes, and suggests that some might choose it for their life work. He gives an indication of the sort of training which those who do so should adopt.

In this connection it is interesting to note that among the questions to be discussed at the International Penitentiary Congress, to be held in London in 1915, are whether laboratories should be installed in Penitentiary institutions for the scientific study of their inmates, and whether such study is likely to lead to knowledge of the causes of criminality and the best methods of treating criminals.

The Eugenic Aspect of the Employment of Married Women.—The recent discussion in the London County Council on the advisability of employing married women as school medical inspectors and the circular issued by the Post Office, stating that postmistresses and sub-postmistresses would be dismissed on marriage, show that the practice of barring married women from skilled employments is being widely adopted, and may be affecting such a number of women as to be of eugenic importance. It may, perhaps, be asserted that a department should not decide whether to employ married women or not on any other grounds but those of economy and efficiency, and that therefore eugenic considerations are irrelevant. But this position is not one likely to be seriously maintained by thinking people at the present day, and public institutions are generally expected to set the example of not seeking to obtain immediate advantages at the expense of the general welfare of the community. Although we are well aware that the whole question is too complicated to discuss adequately in the space of a short

note, we will endeavour to state as briefly as possible the case which may be urged on purely eugenic grounds against the dismissal of women from skilled employment when they marry. It is generally recognised that under utopian conditions the married woman should never be forced by economic pressure to leave her home and children, and we do not imagine that many married women with children would undertake extraneous daily work at all, unless forced to do so to maintain the home. The main question is therefore not whether married women should be allowed to work, but whether those who must work should pursue the calling for which they are trained, or whether they are to lose on marriage the advantage of their professional qualifications, and thus be forced to seek some other employment under conditions which may be more detrimental to the well-being of the family.

The prospect of having to adopt the latter alternative is likely to deter many women from marrying at all, and to retard the marriage of others. Both these consequences are dysgenic. Among wage-earning women, those who have proved their efficiency by earning their living at skilled work are probably superior in energy and intellectual capacity than the remainder, and, as the excess of women over men makes it impossible for all women to marry, it is just these who should not be prevented from so doing. It may, perhaps, be argued in answer to this that such women even if they do marry are likely to have very small families, but the answer to such an argument is that small families are better than none at all. Even if marriage is postponed for them and not actually prevented the results are not much better, since late marriage admittedly leads to many evils, apart from the consequent reduction in the size of the family. There are also other grave objections to conditions which tend to place unreasonable restrictions on marriage, besides those we have been considering. For it may well be expected that the people affected will try to minimise the hardship entailed, either by contracting secret marriages or by entering into irregular unions. Where the restrictions are really unreasonable such unions might come to be condoned by public opinion, and thereby the institution of marriage itself

would fall in prestige. We hold that the essential method of eugenics is the ennobling of marriage, and thus regard any contrary tendency as undesirable in the highest degree.

The Feeble-Minded in Australasia.—We learn from the *Adelaide Advertiser* that the Australasian medical congress, held at Sydney in 1911, decided to make systematic investigations into the problems connected with the feeble-minded population of Australia and New Zealand. For this purpose they appointed a representative in each State to form a local committee, and in addition organised a central committee consisting of Dr. Jones (Inspector-General of the Insane in Victoria) and three others. The function of the central committee was to collect and co-ordinate the data and to report to the New Zealand Congress at the beginning of this year. Their report has now been completed, but is in some ways disappointing as they were unable to make anything like an accurate estimate of the prevalence of mental defect. This was due partly to the unwillingness of the medical profession to supply the information asked from them—out of the 2,450 who were approached on the subject only 211 responded—partly to similar unwillingness on the part of the heads of schools, and in Queensland to the hostility assumed by the Director of Education towards any enquiry in the State schools. From such returns as were available the committee concluded that at least four per thousand of the total number of school children were definitely feeble-minded, and three times that number were dull enough to require special training.

The committee recommend the establishment of special day schools and of residential schools, both paying and non-paying, where children suspected of being mentally defective might be kept under observation, so that those found actually to be so might be properly trained, while the rest were sent back to the ordinary schools. They further recommend the establishment of residential colonies with separation of the sexes for the permanent care of the feeble-minded when grown up. They suggest that moral defectives might be dealt with to a large extent by these institutions, or might require some special provision.

THE PROBLEM OF THE SEX-RATIO.

By J. A. COBB.

There are several unsolved problems connected with the sex-ratio of man, *i.e.*, the ratio which the number of males bears to the total population. Before discussing the problems I will set out the principal facts known about the sex-ratio.

There are three sex-ratios which concern us—(1) the sex-ratio at conception. This is important from a biological point of view. Its value can only be roughly estimated, but it is decidedly high, the number of males conceived notably exceeding the females. (2) The sex-ratio at birth. By this is meant the ratio of the number of boys born alive to all those born alive. Of this sex-ratio accurate statistics are available. The chief source of error seems to lie in the fact that in some countries infants who are born alive but who die before registration are counted as still-born. As such infants include a higher proportion of males than other infants their enumeration would tend to slightly raise the birth sex-ratio in those countries. In all countries the sex-ratio at birth is somewhat over '5, in England it is about '509. (3) The sex-ratio at the age of reproduction or marriage. At this age there is a surplus of women. At all ages past childhood there are more women than men owing to boys having a higher death-rate than girls, and as men are usually older than the women they marry, the proportion of marriageable men to marriageable women is still further diminished.

Let us just consider the sex-ratio at birth. Although this sex-ratio is fairly constant, it is subject to various fluctuations. It varies from one country to another, rising from '509 in England to '513 in Germany,¹ and to still higher values in Spain and Servia. Moreover, it varies from one part of a country to another, as is shown in the case of England by Yule².

The sex-ratio also varies from year to year. It fell in England until about 1890, when it began to rise. In France it fell steadily all through the nineteenth century. In other countries it has remained stationary or has risen.

Apart from what may be called the secular variation of the sex-ratio there is a seasonal variation. This was observed by Dusing in the returns of the births in Prussia for the years 1875-87³. He noticed that in those months in which there were more children born per day there was a smaller proportion of males. His figures were:—

Month of birth	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Births per day	3087	3153	3087	2962	2859	2787	2813	2937	3169	3005	2989	2976
Sex-ratio	... '5151	'5149	'5145	'5146	'5151	'5164	'5157	'5151	'5149	'5150	'5161	

If one calculates the correlation between the sex-ratio and the number of births, it is found to be —'64, which would seem to show that the connection between birth-rate and sex-ratio is not fortuitous.

In order to test the matter further I obtained, by the courtesy of the Registrar-General, the returns of the births of the sexes separately for each quarter for the years 1840-1910. This gave the following results:—

	1st quarter	2nd quarter	3rd quarter	4th quarter
Total births	... 14252372	14301201	13792097	13549494
Births per day	... 2225	2213	2111	2074
Sex-ratio	... '50981	'50943	'50999	'51023

Although the sex-ratio varies very little from quarter to quarter the differences are too great to be due to chance. The correlation between

¹ Statistique Internationale du Mouvement de la population. Paris, 1907.

² Yule. Introduction to Theory of Statistics, 2nd edition, p. 263.

³ Dusing. Das geschlechts verhaltniss der Geburten in Preussen.

the sex-ratio and the number of births per day is —·85, a result which agrees with that of Düsing.

The sex-ratio also varies with the size of the family. In Saxony for the years 1876-85 when a child's birth was registered, the number of his brothers and sisters was given. From Geissler's work¹ we get the following table of the sex-ratios of these incomplete families:—

Number in family	...	...	2	3	4	5	6
Sex-ratio	...	...	·5134	·5147	·5138	·5140	·5140
Number of births, 000's omitted	...	447	540	596	601	572	
Number in family	7	8	9	10	12	13	14
Sex-ratio	...	·5146	·5147	·5150	·5175	·5169	·5168
Number of births, 000's omitted	...	504	429	346	265	184	128
						79	47
							55

It is to be noted that these data are not independent, e.g., some of the families of eight are included in those of nine, while the first eight of some but not all of the families of nine are included in the families of eight.

From this table it appears that the sex-ratio remains about the same for families containing less than eight or nine children and rises rapidly in the larger families.

The question arises whether this excess of males in the larger families is due to later births being more often male than earlier ones, or is it due to the fact that larger families have an excess of males from the beginning. Geissler's data show that the second hypothesis is the correct one. For the 996,761 children whose births were registered were in the proportion of 5,149 males to 10,000 births, while if their sex-ratio had been the same as that of their elder brothers and sisters the proportion would have been 5,153 to 10,000. I may mention in this connection that I have found in the case of families of mares taken from the General Stud Book that there were 10,188 males in the first third part of the families and only 9,803 in the last third part. This discrepancy is greater than could be due to chance, and shows that in this case there is a tendency for fewer males to be born as the mares get older.

One is led, then, to the conclusion that there is some connection between fertility and excess of males. This is shown by the following table, which compares A, the sex-ratio of the first n members of all families with at least n members, with B, the sex-ratio of the first n members of families with more than n members:—

N	..	2	3	4	5	6	7	8
A	..	·5134	·5147	·5138	·5140	·5140	·5146	·5147
B	..	·5138	·5139	·5141	·5141	·5149	·5147	·5156
N	..	9	10	11	12	13	14	15 and over
A	..	·5150	·5175	·5169	·5168	·5190	·5202	·5242
B	..	·5178	·5173	·5171	·5192	·5201	·5210	·5264

The B row is almost always greater than the A row. This shows that when n children have already been born those families which have a larger proportion of males are more likely than the others to further increase in numbers.

This excess of males in the larger families may be attributed to the fact that still-births and abortive births, while they reduce the size of the family, also reduce the proportion of males in it, for prenatal deaths show a higher sex-ratio than the sex-ratio at birth. Consequently the larger families in which the proportion of abortive births is small contain a larger proportion of males.

When all these fluctuations have been eliminated there still remains a considerable variation in the sex-ratio of families of the same race and period and of the same size. If the sex-ratio were the same in all the

¹ Geissler. Beiträge zur Frage des Geschlechtsverhältnisses der Geborenen Zeitschrift des K. Sachsischen Statistischen Bureaus. Jahrg. 1889, Heft 1.

53,680 families of eight given by Geissler, it is easy to calculate how many families would have eight boys, how many seven boys and one girl, and other combinations. The following table shows the proportion of each class on the hypothesis that the sex-ratio is fixed, and also the proportions that actually occur.

Boys	...	...	...	8	7	6	5	4
Girls	...	...	...	0	1	2	3	4
Calculated	...	...	...	.00492	.03714	.12258	.23118	.27257
Observed				.00637	.03897	.12440	.22222	.27867
Difference				+ .00145	+ .00183	+ .00182	- .00896	+ .00610
Boys	...			3	2	1	0	
Girls	...			5	6	7	8	
Calculated				.20556	.09692	.02611	.00308	
Observed				.19838	.09931	.02766	.00400	
Difference				- .00718	+ .00239	+ .00155	+ .00092	

There are more cases of a great excess of boys or of girls than would be expected if the sex-ratio were the same for all families. In fact the observed figures are such as might be expected if the sex-ratios of the various families differed amongst each other to such an extent the square root of mean square of deviation from the mean amounted to .033. This is easily calculated, for if σ_c^2 is the mean square of the calculated deviation and σ_o^2 that of the observed deviation, the standard deviation of the sex-ratio is $\sqrt{\sigma_o^2 - \sigma_c^2}$.

The mean sex-ratio of all families of eight was .515, and one may draw from the table the conclusion that about one-half the families have a sex-ratio between .536 and .494, while the remaining families have a sex-ratio outside those limits.

The standard deviation of the sex-ratio of all the families appears in the following table:—

Number in family	...	...	2	3	4	5	6	7	8
s. d. of sex-ratio	...	...	.038	.031	.025	.014	.026	.029	.033
Number in family	...	...	9	10	11	12	13	14	15
s. d. in sex-ratio	...	...	.039	.040	.042	.049	.048	.063	.055

the mean value of which is .032.

Some French statistics¹ give for 137,838 families of two the value .026, and for 33,724 families of three the value .024.

It results from the variation of the sex-ratio that a boy must have on the average more brothers than a girl. For the boys are bunched together in some of the families and the girls in others. This can easily be verified in Geissler's table for families of eight:—

Boys in each										
family	...	8	7	6	5	4	3	2	1	0
Total boys	...	2736	4644	40068	59645	59836	31947	10662	1485	
Total girls	...	2092	13356	35787	59836	53245	31986	10395	1720	

The 2,736 boys in the families where there are eight brothers have seven brothers each, that is, 19,152 in all. The 14,644 boys in families where there are seven boys and one girl have $6 \times 14,644 = 87,864$ brothers. So all the 221,023 boys have 800,000 brothers.

Each boy has therefore $800,000/221,023 = 3.62$ brothers and 3.38 sisters. Each girl has, on the other hand, 3.58 brothers and 3.42 sisters.

The same thing applies to families of other sizes. In all the families there are 2,468,305 boys who had brothers and sisters in the proportion of 5,186 to 4,814, while the brothers and sisters of the 2,325,999 girls were in the proportion of 5,118 to 4,882.

¹ Statistique des familles en 1906. Paris. Imprimerie Nationale, 1912, pp. 57 and 58.

It may at first sight appear strange that a boy should have more brothers than a girl, it might seem that if one boy is taken from a family it would make the proportion of boys to girls left less than if a girl is taken from it. But it must be remembered that one starts by selecting a family in which there is at least one boy and that the greater number of boys there are in the family the greater is its chance of being selected. A girl, on the other hand, is more likely to be taken from a family containing more girls. If all families had the same sex-ratio a boy would have brothers and sisters in the same proportion as a girl. It would be analogous to the result of tossing eight coins a large number of times. The fact that in one batch of eight a coin taken at random proved to be a head would not affect the probable proportion of heads and tails in the remainder of the batch. If, on the other hand, there were several sets of coins, some of which were constructed to give a bias towards heads and others towards tails, the fact that a particular coin chosen at random in a batch proved to be a head would make it more probable that the batch had a bias towards heads, and consequently it would increase the probability of the others in the batch being heads. This latter case is analogous with that of the variable sex-ratio that we find.

The matter can be treated in another way. The numbers of pairs of brothers, of sisters, and of brother and sister can be used to form a four-fold table,¹ thus :—

	Brothers.	Sisters.
Brothers	... ... 80000	... 747161
Sisters	... ... 747161	... 711758

From this the coefficient of association and the correlation between members of the same family in respect to sex can be calculated. The former is .009 and the latter .0049.

If a boy and a girl are taken at random from amongst all the families of all sizes in Geissler's data it is found that the boy has more brothers and sisters than the girl. The boy has 2·753 brothers and 2·556 sisters, 5·309 in all, while a girl has 2·712 brothers and 2·579 sisters, 5·291 in all. This is due to the fact that there is a larger proportion of males in the larger families, and, consequently, a boy on the average belongs to a larger family than a girl.

We must now enquire into the cause of this variability of the sex-ratio.

It is no doubt partly due to the occurrence of twins. Twins have a tendency to be of the same sex, and, consequently, a boy who is a twin is likely to have more brothers than a girl who is a twin. This factor is not important enough to account for more than a small portion of the variability of the sex-ratio. This subject is difficult to deal with. For there is a larger proportion of twins in the larger families, but adequate statistics are not available. Another cause of the variability is the occurrence of abortive births, which affect the sex-ratio to an unequal degree in different families. This again will only account for a small part of the actual variability.

One is therefore led to the conclusion that there is some other cause of the variations. It naturally occurs to one that it may be an innate variation subject to the laws of heredity. The only sex-ratio, the heredity of which has been investigated, is the sex-ratio at birth, and the question whether this is inherited has not been settled with any certainty. In other words, it is not recognised that a person who is born of a family in which one sex is unusually numerous would himself be more likely to have children of that sex. The correlation between father and son for most qualities that can be accurately measured is about .5, but for the sex-ratio the correlation has been shown to be much less than that. This might have been anticipated. For the correlation between father's sex-

¹ Yule. Introduction to Theory of Statistics, pp. 38 and 217.

ratio and child's sex-ratio is more comparable to that between uncle and nephew as respects personal qualities, and this is smaller than that between father and son. Moreover—and this is the important point—the sex-ratio cannot be estimated with certainty unless the family is infinitely large, the square of the standard deviation of such an estimate being about $\frac{1}{4n}$. So the observed correlation must be multiplied by approximately $\sqrt{\frac{(c_3)^2 + \frac{1}{4n}}{c_3}}$ to give the true value of the correlation.

A correlation between the sex-ratios of parent and offspring has been found by those who have investigated the matter,¹ but the investigators, having found a low correlation and not seeing that a low correlation was to be expected, assumed that such correlation as was found was not significant, but was merely due to insufficient data. They, therefore, rashly came to the conclusion that the sex-ratio was not inherited.

But even if the sex-ratio at birth were proved to be inherited it would not necessarily follow that the sex-ratio at conception is subject to the laws of heredity, for there might be heritable factors such as anti-natal mortality which would affect one sex-ratio and not the other. We are therefore reduced to general reasoning as to the inheritance of the conception sex-ratio, and there seems to be strong grounds for believing that it is subject to the laws of heredity. In fact, it seems strange that it should not have been taken for granted. All other qualities of human beings are assumed to be inherited unless they come under the heading of acquired faculties, when their inheritance is strongly disputed. Sex is certainly not an acquired faculty, and so the burden of proof seems rather to lie on those who deny that it is inherited. If the sex-ratio were not variable; or if the variations were not inherited, it is difficult to see how in the course of evolution the sex-ratio has changed.

It is at any rate worth while to trace the result of assuming that the sex-ratio is inherited.

If we take the sex-ratio at birth it appears at first sight that the numbers of the sexes born will become equal. For if there are more born of one sex, say, the male, a female will have a greater chance of finding a mate than a male. There will be more matings, therefore, among the descendants of mothers of females than amongst the descendants of mothers of males. The mothers of females will therefore be better represented in the third generation, and as their characteristic is assumed to be inherited, there will be a tendency for the sex-ratio to diminish until it reaches equality in numbers between the sexes at birth. The same argument will show a tendency towards equality between the numbers of the sexes at the time of conception and at the age of marriage.

The numerical equality of the sexes may therefore be accounted for in a general way on the ground of heredity, not as has been often said, because as between race and race that race would survive in which the sexes were nearest equality, but because, as I maintain, within the race those individuals who tend to reduce the inequality of the sex-ratio will have more descendants. This is in accordance with the general trend of evolution. The qualities that have survived are chiefly those that have helped the individual possessing them and his offspring rather than those which were more useful to the race than to their owner.

In the above argument as to the tendency of the sexes towards an equality of numbers the effect of the fact that the young of the male sex have a higher death-rate than those of the female has been neglected. A consideration of it will account for the higher sex-ratio at conception and at birth, and for the lower sex-ratio at the age of marriage. If we

¹ Biometrika, vol. v., pp. 73, 79, and 436; vol. vi., pp. 109 and 120.

assume that males and females are conceived in equal numbers, a male at conception will have the same chance as a female of eventually finding a mate. Now if males have a higher death-rate when young the chance of mating of any male taken at random from amongst all males conceived will not be diminished. For if one male dies his chance will vanish, but the chance of the remaining males will be correspondingly increased.

If, however, the amount of food for the family is limited a mother of boys will be able to provide for them more easily for a larger proportion of them will die early and will therefore not require so much food. This will tend to give an advantage to the brother or sister of boys over the brother or sister of girls. A brother or sister of boys will be less likely to be starved and more likely to grow to maturity and to marry. He or she will have a tendency to produce more males than a brother or sister of girls. The sex-ratio will therefore rise until the less expenditure attendant upon the birth of a boy is balanced by the smaller chance a boy will have of finding a mate.

The differential death-rate has an effect on the sex-ratio at the age of marriage opposite to that which it has on the sex-ratio at conception and at birth. For a male costs more than a female to rear to adolescence, since each adult male is the survivor of a larger number of male children than a female is of female children. So the male adults costing the mother more, will become less numerous at the age of adolescence. Let us examine the matter more closely. Suppose that the conception sex-ratio and the differential death-rate so adjusted as to allow the numbers at the age of marriage to be equal. Then if the male adult costs the parent more than the female, those parents who have less than the average proportion of sons will rear more children to the age of marriage than the others. So under these circumstances a boy or girl will have a greater chance of growing to adolescence the lower the sex-ratio of his parents. This will therefore lower the sex-ratio at conception until the number of women at the age of marriage is greater than that of the men, but will not lower it beyond the point where the excess of women, due to the cost of their rearing being less than of men, is checked by their smaller prospect of finding a mate.

We have now shown how the differential death-rate raises the sex-ratio at conception and lowers that at marriage. The sex-ratio at birth will be intermediate between the other two, for it can be easily shown to be lower than the conception-ratio, and higher than the marriage-ratio.

It may be objected that at present starvation is not common enough to play an important part in the matter. That may be so, but one has not to go back many generations before one finds that in the bulk of the population starvation was practically the only check to its increase. The sex-ratio was established by the condition of affairs existing then. One would not expect heredity to alter the sex-ratio quickly.

There is another point to be discussed. The fact that a man is generally a year or two older than his wife might seem to have some influence on the sex-ratio and it seems to have been thought by Sadler and others that the preponderance of male births was due to this circumstance. Investigation showed, however, that the relative ages of husband and wife did not affect the sex-ratio of the offspring. If when the population is increasing a man selects his wife from those born two years later than himself, it gives him a larger number from whom to choose than if he took his wife from those born the same year as himself, for the number of births of girls increases from year to year. This, then, increases the man's chance of marrying and diminishes the woman's. But this biological advantage to the man is precisely balanced by the fact that the time between the birth of father and son is longer than that between mother and son. So the population does not increase so rapidly on the male side as on the female. The fact that a man marries later on the

average does not therefore affect the probable number of the descendants of any male taken at random at the time of conception.

The foregoing analysis of the causes which brought the sex-ratios to their present values should form a basis for forecasting the proportion of the sexes in the future. The question as to the future proportion of the sexes at the age of marriage is the most important and the easiest to answer. A diminution of the death-rate in childhood may be anticipated, and as this death-rate is higher in the case of the male sex, the result in the near future will probably be a considerable increase in the proportion of men to women at the age of marriage until eventually the two sexes become about equal in number. This same cause will also probably eventually lower the sex-ratio at conception and at birth.

The above remarks are merely made to show some of the factors which will have to be considered before the problem of the sex-ratio is solved.

REVIEWS OF RECENT BOOKS.

Westermarck, E., Ph. and LL.D. *Marriage Ceremonies in Morocco.* London. Macmillan and Co., Ltd.; 1914; price 12s.; pp. 422.

THE possibility that a sort of eugenic instinct exists in the human race is suggested by the fact that marriage is surrounded by more ritual than any other human function and by the special character of some ceremonies. In number and variety the symbolic and magical performances collected by Prof. Westermarck are remarkable. His general explanation, which will serve as a working hypothesis for the study of all ceremonial, is that marriage ritual is an application of magical ideas for the purpose of ensuring the safety and welfare of the bride and bridegroom. "A very large number of marriage ceremonies spring from the feeling or idea that bride and bridegroom are in a state of danger, and therefore stand in need of purification and of special protection against magical influences and evil spirits." To this chief class belong such customs as shutting up the bride in a box, dressing her as a man and the groom as a woman, and the curious quivering noises made by the attendant women on all possible occasions. Ceremonies with a positive intention include many whose object is to make the bride a mother and a mother of male offspring.

Thus the bridegroom's mother sings a song praying for male twins "or even one son"; or she carries a sieve or a bundle of her son's old clothes on her back, like a baby. A married woman who is blessed with children is selected to tie the magical knot, *hayek*, that the bride also may be fruitful. An interesting detail is that the more beautiful of the two young wedded people performs the usual ablution before the other on the wedding night; it is believed that the children will resemble that parent. Again, precautions are taken to prevent the offspring being diseased. Superstition in the service of eugenics has evidently been a force in human history.

Other sources for this or that ceremonial are justly admitted by the author. The origin of many is mixed. For instance, there are several which express or symbolise sexual bashfulness, a fact in itself indirectly eugenic.

Prof. Westermarck has resided among the tribes whose customs he has detailed so carefully, for various periods amounting in all to six years. This condition enhances the value of one of the most important contributions to the history of marriage.

A. E. CRAWLEY.

Reissheimer, HERMANN. *Evolution by Co-operation. A Study in Bio-economics.* London. Kegan Paul, Trench, Trübner and Co.; 1913; price 3s. 6d. net; pp. 200.

In this book the author attempts to show—what he regards as a new principle of evolution—that a necessary condition for advance of type is that the organism should contribute at least as much to the total supply of nature as it takes from it. The relations of organisms should be like those of manufacturers, each produces something which the other lacks; if an organism lives at the expense of another without contributing anything in return, it *ipso facto* degenerates. When a species lives "legitimately" it adds directly or indirectly to the total food supply, and thus the Malthusian doctrine of over-production of individuals is said to fail. It is, of course, obvious that if an organism lives in such a way as to increase its own food supply, as in the case of an insect which feeds on and at the same time fertilises a flower, it has a better chance than one which merely destroys its food, and further that species which have a wide choice of food and habit are more likely to give origin to new forms than those which are specialised for one set of conditions. Apart from giving

instances, mostly well known, of this kind of relation, the book seems to shed little fresh light on the problem of evolution.

L. DONCASTER.

Haldane, J. S., M.D., LL.D., F.R.S. *Mechanism, Life, and Personality: An Examination of the Mechanistic Theory of Life and Mind.* London. John Murray; 1913; price 2s. 6d.; pp. 139.

IN this book of four lectures delivered last May at Guy's Hospital, Dr. Haldane has developed, in a remarkably attractive and assimilable form, his views on a subject of unfailing interest. Commencing with a fair and lucid exposition of the mechanistic hypothesis of living organisms and the physiological observations upon which this hypothesis is founded, he discusses more superficially the objections raised in favour of vitalism, only to reject this alternative hypothesis as "unproved, unintelligible, and practically useless as a scientific working hypothesis."

On such a clear and tangible foundation it is a little disappointing to find that the mechanistic hypothesis is rejected on no better ground than that of the extreme complexity of the intracellular mechanisms required for the ordinary functions of cell life, and for heredity; in view of our ignorance of the possibilities of molecular structure, such a conclusion would seem to be somewhat presumptuous. Moreover, when we look further for an alternative hypothesis, we are merely frustrated by a philosophical discussion on the reality of the phenomenal universe, and a not very relevant presentation of idealism.

That there is nothing in the mechanistic hypothesis which is inconsistent with the purest idealism must be familiar to all students of Huxley; and we imagine that Hume would have particularly resented the assertion (p. 74) that he had proved the world of matter to be non-existent. Nor does it help matters to place organic beings in a special category; if the physicist is right in attempting to express the relations between physical quantities in terms of mathematical symbols, although the symbols are avowedly not physical quantities, the physiologist is equally right in explaining physiological mechanisms, even the most obscure and intricate, in terms of physics and chemistry.

It is, indeed, to be regretted that Dr. Haldane, in developing speculations of great philosophical interest, should have founded them, in appearance, upon the supposed inadequacy of the mechanistic theory; for not only does he fail to establish this inadequacy, but there remains between the physiological and the philosophical portions of his reasoning an unbridged gap in an argument, which in other respects he has taken pains to make complete.

Unquestionably the best lecture of the four, both from the literary and from the scientific point of view, is the last, entitled "Personality." Here, in a purely philosophical region, the author develops the consequences of the thesis that the phenomenal world is a product of personality; and in particular of the personality of an organism, itself adapted to its environment. The conception bristles with paradoxes, and it is only by appealing to an ultimate unity in the universe of personality that it is possible to escape from the sophistry of "racial solempsim"; nevertheless, it is by powerful reasoning as well as by brilliant creative thought that we are led to the conclusion, that "This world and all that lies within it is a spiritual world." R A. FISHER.

Dealey, JAMES QUAYLE. *The Family in Its Sociological Aspects.* London. G. G. Harrap and Co.; 1913; price 1s. 6d. net; pp. 137.

THIS little book does singularly little justice to its title. The first seven chapters comprise a somewhat poor and unconvincing historical outline, culminating in the modern family of American democracy.

"It is possible, therefore, to get a much clearer idea of the modern family, in its later aspects at least, from a study of the American family

than from a study of the varying types prevalent throughout Western civilisation as a whole. Modern democratic movements have affected it profoundly, and there is evolving in consequence a type of family which itself reacts on democracy and aids in its development. It is probable that the American family represents, notwithstanding its transitional conditions, a movement towards a higher type of family than any now existing and will furnish the basis on which will rest the better civilisation of coming centuries" (p. 76).

Primarily concerned as he is with this almost vestigial form of the family, surviving in modern conditions, we can perhaps understand why Mr. Dealey is satisfied to consider the position of marriage and divorce in relation to Church and State, as the principal sociological aspect of the family in the past.

The four remaining chapters, concerning subjects with which the author is evidently better fitted to deal, contain an interesting account of the effects of urban conditions, and a survey of the methods by which these effects might be combated.

Mr. Dealey advocates a vigorous social policy for all the evils of city life, including somewhat drastic restrictive eugenics; while powerful efforts to inculcate higher ethical ideals are to complete the process of racial regeneration.

"This is the age of the child, emphasising its rights and demanding that every child born into the world has honourable parentage, right training, a morally stimulating environment, and full opportunity through education to make the most of his latent powers. A civilisation with such aims need have no fear of racial decadence, but rather may rely on a pure family life, a permanent monogamous tie, and a society largely free from its present defilements" (p. 134).

R. A. FISHER.

Schofield, DR. A. T. and Vaughan-Jackson, DR. P. *What a Boy Should Know.* London. Cassell; 1913; price 2s. 6d.; pp. 118.

THERE is little to be said about this book, except that of its kind it is good; it is written simply, clearly and delicately, and it is hardly possible to imagine the most fastidious parent taking exception to any phrase throughout.

Nevertheless, we cannot resist the opportunity of remarking that in our opinion the book is part of a mistaken system of giving moral instruction to young boys. We hold strongly the necessity of such instruction, but the grand question is not the what? but the how? and this question is not answered by any book, whether addressed to boys or to parents. That is to say, anyone with any insight into moral problems and boy life must be aware that even a book like this one is sure to be suited to a few youngsters and unsuited to a good many more. It is probable that to those for whom it is unsuited it would do no harm. Some, if left to themselves, would find it dull; some would feel their curiosity stirred and would wish to know more than the book tells them; to a small minority it would be exactly what is wanted; but those who would find it sufficient in itself would be only a handful.

The facts of human nature must be faced, and the first is the immeasurable difference between temperaments and minds. Among boys exposed to the same influences, one at 14 will be found to be wholly ignorant of natural processes, while another will have become morbidly interested in them at 10. If the problem is considered which arises out of this diversity, we think there should be agreement on the method of imparting the teaching; and we believe the soundest to be as follows:—First, there should be a determination to make this instruction part of the general training in self-control on its moral side, and on its intellectual side part of the general intellectual training given first by the mother, then by the father. Broadly speaking, it is hardly possible to avoid the

risk of exciting interest just in those matters where it ought to be as long as possible dormant, unless the teaching is assimilated to the general teaching of the home.

Next, it should be recognised that the special instruction required about the age of 12 is very little, but it should be quite plain and to the point. Here, of course, a difficulty arises. The father does not know what form of words to use. The best plan, therefore, is to choose a short flyleaf or little pamphlet, such as those sold by the St. George's Press, Dover, and for the father to give one to the boy *to read in his presence*; and at the end all that is needed is to exact a promise that if the latter gets into any trouble at school he will be sure and tell his father at once; or, if he has any further questions to ask he will ask them of him and not of his school-fellows. This is not a perfect system, but it gets over many difficulties and is free of the danger of exciting undesirable interest or of wearying the mind, which very likely may be quite unable to take any lengthy teaching in, or to keep it in its right perspective.

E. LYTTELTON.

Clouston, SIR T. Before I Wed. London. Cassell; 1913; price 2s. 6d.; pp. 130.

THIS book differs widely from many which we have read on the same subject. It is not an exhortation addressed to growing youths, but an essay on the moral and scientific aspects of adolescence. The tone is elevated and free from cant and professional jargon, and there are some statements as to the effect of continence on health which, coming from an eminent medical practitioner, are weighty and valuable.

It is, however, not easy to say for whom it is written. The author as a rule shows himself too scientifically minded to be able to handle the subject with anything like burning conviction; or in the tone adopted with striking success by the late Sir Andrew Clarke. And it is clear that no other tone will have much effect on young men who are face to face with sexual passions. There is something in these pages which smacks far too much of the philosopher in his study when the need is for an Apostle or Prophet. It is a disquisition, lacking in trenchant force and directness, and not likely, we fear, to give much support to those who are wavering on the edge of the precipice.

Moreover, as a disquisition, it is inevitably exposed to the danger of mixing up science, morals and religion. The prevailing tendency of all such writing is either to utter familiar scientific truths well within the domain of science, or to stray outside the limits and lay down propositions which are either platitudinous or disputable, or unintelligible. Some of each kind could be found in this book. On p. 30 we read "Science, no doubt, points to repression being necessary under certain conditions and from physiological, social, legal, ethical and religious motives." But if it deals in any of the last four kinds of motive it ceases to be science. Later on in the same page, what are we to make of the following:—"Hence the value, if we are to understand the philosophy of marriage, of studying its psychology and higher meaning and of tracing out everything connected with it"? This is very loose writing and conveys no distinct meaning. On p. 42 an astonishing proposition is found. "This process of strengthening inhibition . . . should be the bed-rock of religion and the chief aim of all religious teaching." Is it conceivable that this statement is introduced with the words: "I would lay down the proposition on scientific principles that the chief aim of all education . . . should be the strengthening of the power of inhibition"? But how can scientific principles show what the bed-rock of religion is? If, too, one thinks what inhibition means, all precision of language is set at nought when it is connected, as above, with religion. Indeed there is a great deal of very confused thinking and writing all through the book. On the other hand, a very prevalent kind of exaggeration is avoided in the last chapter.

E. LYTTELTON.

Tredgold, DR. A. F., M.R.C.S.Eng. *Mental Deficiency (Amentia)*. 2nd Edition. London. Ballière, Tindall and Cox; 1914; price 12s. 6d.; pp. 491.

THIS is the second edition of a work which, since its first appearance in 1908, has been steadily winning its way as the best book on its subject in the English language. It covers the territory it professes to deal with in as complete a way as our present knowledge permits. It treats the subject not only in detail but in a large scientific spirit. It takes into account the pathological, statistical, sociological and eugenic aspects of mental deficiency arising from birth or shortly afterwards. There are few subjects which are of more importance to the science of eugenics than a study of the mental deficiencies of human beings. If we could arrive at a correct knowledge of their nature and causation many of the problems of that science would be solved thereby. Dr. Tredgold, after discussing the factors of causation, arrives at the conclusion that the large majority of cases of early mental defect are due to germinal impairment, in fact from eighty to ninety per cent. are thus caused. He shows that this impairment is liable to be transmitted from generation to generation, the actual conditions in ancestry being not necessarily amentia, but possibly insanity, epilepsy, and what is now commonly called the "neuropathic diathesis," that is a lowered stability of general brain working and less resistiveness to disease, which causes social inefficiency and places its subjects to a greater or less degree among the "unfit." He advances evidence to show that the birth-rate among the neuropathic is decidedly higher than in the healthy community in the proportion of seven children of each marriage to four and a half. The recent statistics of the general fall in the birth-rate give this fact a great social significance. The unfit are thereby manifestly increased. If this cannot be arrested by the means suggested by Dr. Tredgold in his twenty-first chapter, or otherwise, it means in succeeding generations a gradual lessening of national and social efficiency. Natural selection, too, is gradually, in all civilised countries, being more and more affected by artificial selection. Dr. Tredgold takes the view that environmental effects of certain kinds may become heritable.

In this second edition Dr. Tredgold explains the nature of mental deficiency and of the germ defects which underlie amentia more fully than in the first edition. He has re-written the chapters on psychology, moral deficiency, sociology, and diagnosis. He has brought his statistics up to date from all sorts of reliable sources. Though the book is intended primarily for the medical profession, yet its importance and its interest is almost equally great to the eugenist, the psychologist, and the politician who has some strain of science in his ideas. At the present time, when vast and far-reaching schemes of social reform are being carried out or contemplated by Parliament, many of the facts in such a book should be known to every legislator and public man.

To understand the social significance of such a book as this, one has to realise the conditions, hereditary and environmental, that are necessary for the production of a normal man or woman. A reasonably good ancestry, which means a germplasm of normal capacity, an environment of average suitability for the perfecting of the plasm and a normal capacity for the all-important process of development, are absolutely necessary for any nation to advance in civilisation. When we consider the extraordinary complexity of the human brain, its susceptibility to every influence, mental and bodily, to which it is subjected and its innate power of development from a mere mass of undifferentiated cells to the most highly integrated, the most reactive, and the most dominating of all the organic structures in nature, we are able to realise in a measure the importance of suitable sexual mating, of good nutriment, and of a

scientific education for the future of the world. The difference between a good human brain and a bad one is that between light and darkness, but there is a steady gradation from the one into the other in structure and quality in every community. When we consider the yet undiscovered nature of mind and its relationship to organisation and the complexity of the social organisation in a civilised nation, the eugenist may well be discouraged, but this is not the attitude of modern science. We consider that no earnest student of eugenics can afford to neglect or to be ignorant of the main facts and conclusions of Dr. Tredgold's treatise. If we were to refer to one tithe of the relevant facts in that book or to dilate on their eugenic significance we should pass altogether beyond the limits of a review. Take, for example, one genealogical study referred to by Dr. Tredgold. Joseph "Nam" lived in the mountains of Massachusetts about 1760. He had eight children—"Some of the descendants of whom were prosperous, but the majority sank into the lowest social grade and are now living under the most wretched conditions. Of 784 descendants who have been traced it was found that 88 per cent. of females and 90 per cent. of males were excessively addicted to alcohol; 180 were illegitimate. There were 232 licentious women and 199 licentious men, as contrasted with 155 chaste women and 83 chaste men; there were 19 epileptics, 24 insane, of whom seven have been in custodial care; three in a girls' home; 15 in an orphan asylum, and 40 in State prisons." Think of such a biological and social problem as this multiplied by the thousand and you have an example of what the eugenist of the future has to investigate, explain and antagonise!

T. S. CLOUSTON.

Barnett, MARY G. *Young Delinquents: A Study of Reformatory and Industrial Schools.* London. Methuen and Co.; price 3s. 6d. net; pp. 222, xiv.

THE purpose of this book is to give such an account of our reformatory and industrial schools, and of their inmates, as will interest and inform the general public. Miss Barnett's information is derived from frequent attendances at Children's Courts and visits to many of the schools; she has also made herself acquainted with much of the literature and reports on the subject. The result is a book which should certainly be of use to those who wish for information regarding juvenile delinquents and the great strides which have been made in our treatment of this class during the past fifty years. Perhaps nothing brings this home so clearly as the statements that in 1833 a boy of nine years was sentenced to death (but not executed) for stealing 2d. of paint; whilst two boys of fifteen years were transported for seven years for stealing a pair of boots. Miss Barnett traces the gradual change brought about since that time, largely due to the work of Lord Shaftesbury and Miss Mary Carpenter, up to the Children Act of 1908. She gives a useful account of our present system of institutional treatment for juvenile offenders, together with many particulars regarding organisation, management, staffing, methods of treatment and results; whilst her final chapter contains a brief synopsis of the recent report of the Departmental Committee on Reformatory Schools. We think that Miss Barnett is a little out of her depth when she makes the statement that "country dwellers, from an early age, are witnesses of the works of Nature, and therefore their subconscious mind is imbued with a spirit of reverence." Nor are we quite convinced that "a child with adenoids, or even with decayed teeth, may have a perverted moral sense which will be corrected by proper medical treatment." But in spite of these and a few other generalisations which would have been better omitted, the book is still one which we can recommend to those who wish to obtain some knowledge of this class and of the working of these schools.

A. F. TREDGOLD.

Drysdale, C. V., D.Sc. *The Small Family System: Is it Injurious or Immoral?* London. A. C. Fifield; 1913; price 1s. net; pp. 119.

WITH such an untiring advocate of neo-Malthusianism as Dr. Drysdale for author no one can entertain a moment's doubt as to the answer which it is the purpose of this book to give to the question contained in its title. In fact, Dr. Drysdale's enthusiasm for the artificial limitation of the family leads him to attempt much more than the supplying of a negative answer to what is a very pertinent, a very important, and a highly practical question—one, moreover, which eugenics cannot and should not avoid. And this enthusiasm is the cause of the weakness of the book. It is just another case of preoccupation with a single idea leading its possessor to argue in effect that its practice will provide the surest short-cut to the millennium; whereas one of the most hopeful signs of today is our realization of the truth, that there are no short-cuts to the perfection of individual and social life, but that progress lies along a hundred different, though converging, paths. Accordingly, while we are quite ready to agree with Dr. Drysdale that the artificial limitation of the family may not be injurious and is not immoral, we do not look for the same wide and wonderful benefits from its practice. Indeed, it is impossible to escape the conviction that Dr. Drysdale's case is not only weakened, but sometimes rendered positively ridiculous by the lengths to which his over-zealous advocacy carries him. For instance, he would have us believe that that complex of problems generally lumped together for convenience under the title of the housing problem is to be solved by neo-Malthusianism, because "we feel that even as things are, a man and his wife and one or two children can have two rooms and live in some approach to decency. With a greater number of children this position is hopeless However much we may urge the necessity for better and cheaper accommodation, we cannot get over the fact that while this is being settled—and it will only be settled slowly—the most acute phases of the housing problem would be solved in a year or two by the adoption of family limitation by the poor." Can we seriously regard the adjusting of the size of the working-man's family to the number of rooms available as a *solution* of the housing problem? Such a suggestion if carried into effect would rather appear to us to be a highly unsatisfactory way of escaping the problem altogether.

The sociologists, whose duty it is to lead us in a scientific study of social phenomena, have taught us, having regard to the complexity of all social problems, to look with suspicion upon the too extreme claims of those who maintain that amazing and unprecedented benefits must of necessity flow from the particular single line of action which they elect to advocate. What, then, are we to think of the assertions contained in Dr. Dunlop's preface, that, following upon the general adoption of neo-Malthusian practices, "Poverty would, in two or three years time, be banished from this country, and, in a generation or so, from the whole world; there would be a rapid improvement in the quality of the race; and the day of the abolition of war would be actually in sight"?

Dr. Drysdale's consideration of the moral aspects of the question is, we feel, particularly unsatisfactory. Not at all on account of the conclusion at which he arrives; but because some of the most vital considerations leading to a similar conclusion find no place in his argument. We await a more convincing answer.

R. DIXON KINGHAM.

Webb, HELEN. *Life and Its Beginnings.* London. Cassell and Co.; 1913; price 2s. 6d.; pp. 137.

DR. HELEN WEBB treats the subject entirely from a biological standpoint, but the book, though written for girls under 12, should be read by them with the assistance of an older person with a sound elementary know-

ledge of biology and physiology, who would be able to supply them with the fuller particulars which would certainly be required by a child who had read the book with intelligence. It is an excellent handbook for parents.

G. M. CHAMBERS.

Chessier, E. SLOAN. *From Girlhood to Womanhood.* London. Cassell and Co.; 1913; price 2s. 6d.; pp. 142.

THIS book can be given to any girl above 12; it explains simply the stage of development from girlhood to womanhood and gives her sensible and practical advice as to the best means of becoming a happy, healthy, and attractive woman. Dr. Sloan Chessier puts forward a high ideal of life.

G. M. CHAMBERS.

Chessier, E. SLOAN. *Woman, Marriage and Motherhood.* London. Cassell; 1913; price 6s. net; pp. 287.

WE have here another of the popular books of the day dealing with social questions affecting marriage and motherhood, written chiefly from the point of view of women. There is much good work in it. The earlier chapters are historical and treat briefly of the evolution of motherhood, of marriage laws and customs, and of the legal position of the wife and mother at various times and places. The results of sweated labour, the social effects of factory work on the homes and of our prison system are clearly stated. There is an account of the attempts, both on the Continent and in England, to provide pure milk for infants, to feed nursing mothers, and to establish schools for training in the art of home making and baby rearing.

The most obvious omission is the absence of any reference to religious ideals and sanctions as influencing matters connected with sex and social reform. There is also no attempt to deal with the extremely important variations in outlook upon all these questions which result from the physiological and psychological differences of sex. It is the necessity for the constant readjustment of these two points of view—a readjustment required by the ever varying pressure on one or the other of a changing civilisation—that constitutes the extreme difficulty of handling these problems.

It is to be feared that more better organisation of society, with increased inspection and training and more humane treatment on all sides, although it might achieve considerable temporary improvement and is therefore worth working for, would not really help much to a more permanent solution of the eternal problem which confronts humanity.

C. D. W.

Sandeman, GEORGE. *Social Renewal.* London. W. Heinemann; 1913; price 2s. 6d.; pp. 150.

"THE collective or individualist theory of society is inadequate to its real nature, and is therefore false. Society . . . is . . . a real thing on its own account, with a design of its own, a life of its own, and principles of its own. This may be called the *realist* theory of society . . ." (p. 33). This great thought is supported by somewhat arrogant denunciations of the modern social reformer. He is rebuked, for instance, for supposing the social problem to be entirely one of "heredity and breeding" (p. 19): as if anybody ever really supposed it so! But Mr. Sandeman reaches his high-water mark of exaggeration on page 5. "The workers," he observes, ". . . desire to enter into possession; they want abundance of life; they want to grow up . . . and to be free. The reformers and philanthropists intend exactly the contrary; their idea is to elaborate and to aggravate, and to perpetuate the tutelage of the workers." After pointing out the more obvious errors of other people, Mr. Sandeman presents his own discovery. "Real society" is "humanity itself"; and the only thing that can renew society is "charity." There

you are. Occasionally we are told something worth hearing, for instance, that poverty is largely due to "the inordinate diversion of labour to the production of comparatively useless and undesirable things" (p. 108): but the book is not all equally valuable.

A. W. COCKBURN.

Green, C. E., F.R.S.E. *The Cancer Problem: A Statistical Study.* 3rd Edition. Edinburgh. Green; 1914; price 5s. net; pp. 98.
 In the first chapter of this work Mr. Green describes certain diseases of plants caused by myctozoa, and argues that some analogy exists between these conditions and cancer in man. In the next chapter he quotes evidence to the effect that the occurrence of one of the plant diseases referred to is favoured by the use of manures which have been dissolved in sulphuric acid, and then examines the occupational incidence of cancer suggesting that those occupations in which the use or formation of sulphur compounds occur exhibit high cancer rates, but that on the other hand trades, such as those of tanners and papermakers, in which lime is greatly employed, are relatively immune from cancer. In the following chapter the geographical distribution of cancer is considered, and in chapter IV. arguments are adduced in favour of a belief that the combustion of coal leads to the development of cancer, the principal evidence being derived from contrasts between the proportion of deaths from cancer to deaths from all causes in coal burning and peat burning districts. In the last chapter, Mr. Green suggests that calcium salts may have some curative value in the treatment of cancer. The book is only of interest to eugenists in so far as, the real cause of cancer being unknown, the possibility of an inherited constitutional predisposition cannot be ignored. It is therefore unnecessary to review it at length, and we would merely remark that few readers are likely to be convinced by the evidence presented. To take only a single point, the proportion of cancer deaths to deaths from all causes, cannot be compared in different districts unless the age constitutions of the populations are approximately the same, a fact which Mr. Green does not appear to have realised.

M. GREENWOOD.

Pyercraft, W. P. *The Courtship of Animals.* London. Hutchinson; 1913; price 6s.; pp. 318 and 40 plates.

THE title of this book does not suggest any close relation between its subject and eugenics, but the author, in the preface and introductory chapter, shows that he regards the two subjects as closely connected. He writes: "Such facts [the sexual behaviour of animals] have a vitally important bearing on the very problems of social well-being which now loom so largely among us. 'Reform' is in the air. Its protagonists are busy amongst us with schemes for our regeneration, among which 'sex-problems' are made to occupy a very conspicuous place. But no good can come of their cogitations so long as they fail to realise the springs of behaviour in this regard. The facts herein set down will, it is hoped, help much towards this end." The facts given in the book are full of interest; many of them are little known, and, especially when dealing with vertebrate animals, the author is clearly a master of his subject. He is strongly convinced that the realisation of the intensity of the sexual instincts in animals is of importance to would-be reformers of human affairs—"it is idle to speak of an equality between the sexes in this matter, in regard to the human race. Dogmatism, and the frequent repetition of pretty platitudes, will not alter what Nature has ordained." As a collection of facts of the greatest interest the book is admirable, and the descriptions are generally clear and graphic. In his speculations the author is less convincing, and when dealing with the facts of sex in invertebrate animals, is occasionally inaccurate. His contention that sexual selection acts, not by the conscious choice by the female of the most brilliant male, but by the success of the male which most completely

arouses the female's sexual instincts, has much to recommend it, but he throws no new light on the difficult problem of sexual dimorphism in those insects in which experiment shows that the female readily accepts any male. In our opinion, he attaches far more weight to the "hormone" theory than it will bear, as is shown by the existence of gynandromorphs in insects and birds; and the discussion of parthenogenesis is unsatisfactory. These defects arise, however, only where the author strays beyond the proper subject of the book; when dealing with sexual behaviour itself, especially in the vertebrates, his account is excellent, and our only criticism is that the style is marred by rather frequent carelessness of expression, with occasional lapses into "journalese," and that in the later chapters some misprints in names have escaped correction.

L. DONCASTER.

Davenport, C. B. and Rosanoff, A. J. *Reply to the Criticism of Recent American Work by Dr. Heron, of the Galton Laboratory, by C. B. Davenport and A. J. Rosanoff.* Eugenics Record Office, Bulletin No. 11; pp. 43; price ten cents. Cold Spring Harbour; February, 1914.

THIS pamphlet is a reply to one by Dr. David Heron recently noticed in this journal. It will be remembered that Dr. Heron accused the writers of inaccuracy, incompetence and bias, and stigmatised their publications as harmful to the cause of eugenics. The arrangement of the reply is not very convenient, since it consists of two independent papers, one by Dr. Davenport, the other by Dr. Rosanoff, which tend to overlap, and it is somewhat difficult to summarise the case presented. So far as the question of bias is concerned, we think Dr. Heron's charges are fully met, although differences of opinion are possible as to the expediency of some directions cited by Dr. Heron on page 13 of his pamphlet. With respect to the charges of inaccuracy, Dr. Davenport is able to show that a considerable number of the alleged blunders are due to misinterpretation on the part of his critic. We think that on this count of the indictment also, Drs. Davenport and Rosanoff are entitled to acquittal at the hands of their scientific colleagues, although some of Dr. Heron's misunderstandings would have been guarded against had a few notes been added to the original papers.

Finally, as to the general charges of incompetence, we do not think that Dr. Davenport and his co-workers were called upon for any defence, and need make no further reference to that branch of the discussion. There are, however, two points as to which we find Drs. Davenport and Rosanoff's reply unsatisfactory. They energetically repudiate the charge that they were unacquainted with the proper statistical method of allowing for the difficulty introduced into the computation of Mendelian ratios when all the fraternities contain at least one affected member, and we willingly accept their statement. We think, however, they would have been well advised to adopt the method of correction employed by Lundborg (on Weinberg's authority) in a memoir actually cited by Dr. Davenport on page 23 of his reply.

The second point is that Dr. Davenport's explanation (pp. 20-21) of his use of the phrase that "strength may be mated with weakness," does not seem to us adequate and we retain our original opinion that it was injudicious.

Passing from the specific points dealt with, we must observe that one of the evils to be anticipated from Dr. Heron's methods of controversy finds expression in Drs. Davenport and Rosanoff's reply. The language in which Dr. Heron's criticism was expressed has naturally irritated Drs. Davenport and Rosanoff and their irritation has betrayed them into making general charges which, although more courteously phrased, are nearly as foolish as those of Dr. Heron. To argue that because the analysis of massed data by statistical methods cannot solve all the

problems of inheritance therefore such work is nugatory is, we think, merely foolish. It would be as sensible to say that because a horse can travel neither so fast nor so far as an automobile, that therefore the horse is useless for locomotion; there are in truth many paths for which a horse would be invaluable and a motor car mere useless lumber. This is the state of affairs with respect to many problems of human inheritance, and nothing whatever is gained by these mutual recriminations of workers each using valuable tools. We are sure that further reflection will convince Drs. Davenport and Rosanoff of the truth of these remarks and that they will in time come to regard the energetic workers of the Galton Laboratory with feelings of unmixed gratitude. Gratitude both for their contributions to our stock of scientific methods of analysis, and for the entertainment afforded by their onslaughts upon others. Dr. Davenport should remember the Queen of Hearts. "What fun," said the Gryphon, half to itself, half to Alice. "What is the fun?" said Alice. "Why, *she*," said the Gryphon. "It's all her fancy, that: they never executes nobody, you know."

M. GREENWOOD, JNR.

Pitt, ST. GEORGE LANE FOX. *The Purpose of Education*. London. Cambridge University Press; 1913; price 2s. 6d.; pp. 83.

IT is worth while to search laboriously through a ton of cotton-wool if there is one diamond in the middle of it, or to wade through 83 pages of this book to find in it such a sentence as "That narrow outlook on life engendered by strong feelings associated with an inadequate, intellectual and moral equipment, leads to what is known as 'cock-sureness'—a distressing form of conceit impenetrable to pure reason." The rest of the book will appeal to the average reader as confused, unconvincing, and occasionally unjust. This may be the fault of the author, or it may be due to the reader's (or reviewer's) inadequate intellectual and moral equipment, leading to what is known as "cock-sureness"—a distressing form of conceit impenetrable to pure reason.

W. HOPE-JONES.

Mark, H. THISELTON, D. Lit. *The Unfolding of Personality as the Chief Aim in Education*. London. T. Fisher Unwin; price 1s. net; pp. 224.

IT is necessary for everyone for some extent, and for eugenists in particular, to have as clear ideas as possible as to the boundaries between "what I am because I was born so" and "what I am as the result of circumstances." The trouble is that so many psychological works which touch this difficult problem complicate it beyond even its own natural complexity, as well as being dull infinitely beyond endurance. It is greatly to Dr. Mark's credit that he has produced a book which really helps rather than hinders analysis, not by the short cut of pig-headed dogmatism but by genuine reason, presented in as readable a form as one has any right to expect, and with the very minimum (which is rather a large quantity) of technical language.

This analysis is by no means the main theme of the book; but many will find it the most interesting and valuable part of it, with the possible exception of the discussion of "the cosmic memory." The whole book is evidently written with the greatest care, and is singularly free from loose and hasty mis-statements.

W. HOPE-JONES.

PERIODICAL LITERATURE.

ENGLISH.

QUARTERLY JOURNAL OF MICROSCOPICAL SCIENCE. Vol. 59, Part 4. February, 1914. *Chromosomes, Heredity and Sex.* By L. Doncaster, Sc.D. Pp. 487-521. In this paper is presented a review of the present state of the evidence with regard to the material basis of hereditary transmission and sex determination. The author summarises it as follows:—"In the first section a summary is given of the main lines of argument leading to the conclusion that 'Mendelian characters are determined by chromosomes.' Some indication is given of the restrictions, which must be placed on the meaning of this phrase in respect of the part played by cytoplasm in heredity. It is concluded that the arguments in its favour, though very strong indirectly, are not supported by sufficient direct evidence to be regarded by themselves as indisputable. In the second section the chief classes of facts are reviewed which suggest a relation between chromosomes and sex-determination, and a preliminary account is given of a new case of an unpaired 'sex-chromosome' in the female, in a strain of the moth *Abraxas*. It is concluded that the arguments for a relation between chromosomes and sex are much stronger than those connecting chromosomes with Mendelian factors."

In the third section the facts of sex limited inheritance are discussed; these are regarded as strongly reinforcing the arguments of the two preceding sections.

Lastly, certain difficulties are considered, and it is concluded that sex cannot be determined directly by the presence or absence of a factor which merely determines whether an ovary or a testis shall develop, but that the determining factor causes a certain type of metabolism, which in turn leads to the production of one sex or the other. If such metabolism is induced by other causes, an individual of one sex may probably arise from gametes which, in the absence of disturbing causes, would have given rise to the other sex."

E. H. J. S.

JOURNAL OF BIOLOGICAL CHEMISTRY. Vol. XVII. No. 2, March, 1914. *The Action of Various Anæsthetics in Suppressing Cell-division in Sea-urchin Eggs*, by Ralph S. Lillie.

This is an interesting paper dealing with the inhibitory action of certain anaesthetics upon cell-division. It is suggested that the rhythmical process of cell-division, as well as the rhythmical contraction of heart muscle and cilia, depends upon some reversible change in the permeability of the cell-membranes, and consequently that neuro-muscular anaesthesia is caused by inhibiting these changes in the permeability of the membrane. It is also concluded that since the concentration, in a great number of anaesthetic investigations, required to arrest cell-division is the same as that required to produce neuro-muscular anaesthesia in the larvæ, it is inferred that both phenomena depend upon the same alteration in permeability.

BEDROCK. Vol. II. 1914. *Biological Terms*, by G. Archdall Reid. Pp. 515-538. When shorn of its controversial character, this article is a protest against the mis-use of the words "innate," "acquired," "inherit," and "reproduced." Its interest for eugenists lies in the stress laid upon the essential character both of nature and nurture, for without both these factors nothing can be reproduced—nurture, to convert to an actuality the potentiality inherited. The author contends that it is meaningless to say that characters can be either "innate" or "acquired." These words must only be applied to likenesses and differences. Nothing can be inherited but a bundle of potentialities, nothing can be produced without a stimulus, so that all characters must be both innate and acquired, or else neither. It is as ridiculous to say that the ordinary muscular develop-

ment of a man is "innate," but the additional muscular development of the blacksmith "acquired," as it is to call a wall "innate," but the top layer of bricks "acquired." He contends further that had these terms been used correctly, the Darwinian and Lamarckian controversy would never have existed, for the disputants supposed that acquired characters were evoked by something (*i.e.*, nurture) out of nothing, and that innate characters were evoked by nothing out of something (*i.e.* nature); whereas in reality, both nature and nurture have co-operated to produce the characters in question.

The words "inherit" and "reproduce" are also said to be confused. When a child is said to inherit the character of his father, the meaning of "inherit" is shifted to the meaning of "reproduce." The child reproduces the character, the potentiality for which he inherits from his father. The author, however, does not hesitate to say that mental and moral traits are "wholly" developed in response to experience (*i.e.* nurture), when he wishes to show the necessity of still further improving the environment of school children and the poor.

H. O.

BEDROCK. Vol. III. No. 1. April, 1914. *The Instruction of School-children in Matters of Sex*, by Mrs. T. La Chard.

This somewhat discursive article divides the problem of sex-instruction into two parts, "Sex-biology" and "Sex-hygiene." The writer quotes from several early authors and appends a useful though unsubstantial bibliography. The view taken is that sex-biology should be taught at an early age as part of the school curriculum, and that instruction in sex-hygiene should be given to boys and girls at a more mature age, by doctors, parents, school teachers and perhaps clergymen, in a manner which must be decided upon by further experience.

Directions of Recent Work on the Inheritance of Acquired Characters, by H. M. Fuchs.

This interesting paper summarises the most recent work on the inheritance of acquired characters. There are two possible ways in which characters may become inherited. (1) By means of stimuli which affect the soma and through it the germ-cells which form the next generation, (2) by means of stimuli which affect the soma and the germ-cells simultaneously. The first method is designated "somatic induction" and the second "parallel induction." The latter is considered by the author to have been established by the experiments of Standfuss, Fischer and others. He then proceeds to summarise two classes of experiments. (a) Those in which the soma is subjected to unusual conditions, to see whether the offspring are affected, *e.g.*, Tower's experiments with the potato beetle, *Leptinotarsa*, and Kammerer's experiments with amphibia; and (b) those in which ovaries are transplanted to a foster-mother, to see whether somatic characteristics affect the offspring, *e.g.*, Guthrie's experiments with hens, and Castle and Phillips' experiments with guinea-pigs. The interesting work of Sécerov, with a view to ascertaining the extent to which external stimuli can directly reach the germ-cells, is mentioned, as well as other experiments in which the offspring of animals have been shown to have been affected by dyes and poisons administered to the mother. Although the author points out the necessity of using pure strains, and of avoiding the *direct* effect upon the germ-cells of the unusual conditions due to the experiments, yet he does not lay sufficient stress on the necessity of rearing animals under *normal* artificial conditions in order to control the animals reared under *abnormal* artificial conditions, nor does he mention the extraordinary lack of numerical data and detailed description in both Tower's and Kammerer's experiments, or the curious chemical and other elementary inexactitudes that have appeared in the former's work. Further, no mention is made of the earlier experiments, Brown-Sequard's with guinea-pigs and Schübler's with wheat, or of the important work of Wolff and others with micro-organisms.

Dr. Reid on Biological Terms, by the Hermit of Prague. *Terminological Inexactitudes: A Reply*, by G. Archdall Reid.

In answer to an article by Dr. Reid in the last number of *Bedrock*, in which he maintained that to say "acquired" or "inborn" characteristics were inherited was meaningless, the Hermit of Prague, whose reply would be more forcible if it were less facetious, accuses Dr. Reid of confusing "class-names" with "class-definitions," for he holds that the words "acquired" and "inborn" are merely symbols that implicitly contain definitions which have been amply stated in the writings of the various biologists who have used them. Since, therefore, it is plainly ridiculous to substitute a "class-name" for a "class-definition"—unless the original definition is kept in mind—he concludes that Dr. Reid is wrong in supposing that any man (much less Darwin, Spencer and Weismann, who are implicated) would be so ignorant as to use them repeatedly without due consideration for the obvious fact—so much insisted on by Dr. Reid—that all characters are a product of potentiality and stimulus (*i.e.*, nature and nurture).

With Dr. Reid's answer, which appears in the same number, the argument becomes rather tedious, especially as he never appears to come really into touch with his critic, but contents himself with much repetition and with pointing out the fact that the Hermit is not very happy in quoting the definitions said to be implied in the class-names "inborn" and "acquired" by the various authors mentioned—no easy task, considering how many pages Dr. Reid has needed to define his own meaning. Finally, Dr. Reid does not attempt to defend himself for having in a very lucid footnote inadvertently slipped into the terminology he wishes to discard.

HIBBERT JOURNAL. Vol. XII., No. 2. Jan., 1914. *Eugenics and Politics*, by Dr. F. C. S. Schiller. Pp. 241-259. Dr. Schiller emphasises the necessity for politicians never to forget that the family, and not the individual or the society, is the unit that should receive primary consideration. He points out that progress is dependent upon the continued foresight of the human race, and is not automatic. The difficulties of civilisation are increasing, and will be immeasurably greater when the present supplies of coal and oil are exhausted, so that though Malthus was mistaken, yet Malthusianism is no false alarm. All nobilities by their nature fail to reproduce themselves, and tend to die out, though this ordering of society cannot always have existed, for there must have been a time when the fitter survived. Now, however, biological progress has come to an end, and sociological progress has superseded it. Though this is in itself a gain, yet it has introduced the phenomenon of social contra-selection, the elimination of the fit, which has resulted in the birth-rate being recruited from the less able—witness the present lack of officers and clergymen. If politicians do not see that this is reversed by assisting the family-unit and refraining from taxing the middle-classes out of existence, the human race will come to join the physiological failures with the dinosaurs in the museums of the future. H. O.

HIBBERT JOURNAL. Vol. XII., No. 3. April, 1914. Contains a discussion of Dr. Schiller's article, "Eugenics and Politics," by John L. Heaton, R. M. Maciver, and E. H. Bethell.

JOURNAL OF STATE MEDICINE, April, 1914. *Sexual Disease and the Individual*. A. Corbett Smith. This is, after an introduction in a previous number, the second of four papers on venereal diseases. It is of a popular character and is well calculated to interest the average reader. The author, who is also the editor, is a fluent and readable writer, and there is a demand for such information at present. This lecture gives a popular account of syphilis in its various stages, and discusses its import-

ance to the community. It is not free from mistakes and errors of judgment. Ozona, e.g., does not mean "bone diseases"; aneurysm does not mean a gradual closure of the arteries. The quotation from the Registrar's returns is misleading. The conclusion that "at least one-half of all disease, if not a still larger proportion, is due more or less directly to syphilis," is quite unjustified by his premisses; and this sort of statement is the most serious defect of the article, with the general purpose of which we are in agreement. The facts are bad enough; to exaggerate them in this manner is to bring the movement against venereal disease into disrepute.

The May number of the same journal gives an account of "syphilis insonitum," explaining how this disease is handed on to innocent wives and their offspring, and bringing home to the reader its disastrous effect in infantile mortality. Infection of doctors, nurses and others is also dealt with. It is, on the whole, a fair, if a highly coloured, picture; we must only protest at the suggestion, which nobody would now defend, that rickets and syphilis are identical. The series ends with the June number. Here we find an array of statistics, many of which are interesting. Unfortunately, Mr. Corbett Smith has got confused in his interpretation of the figures, and allows himself to abuse other writers without obvious justification. The Berlin figures which he quotes represent persons who were under treatment on a given day; Dr. Blaschko gives an estimate for the proportion of adult males who have at some time or other contracted disease under 30 years of age. The two figures are hardly likely to correspond. He forgets, or does not understand, that syphilis, until the advent of Ehrlich, was rarely cured, and that most persons who acquired syphilis remained syphilitic. Nobody pretends that 7 per cent. of the whole Melbourne populace are infected every year, or that there are 500,000 new syphilitic infections annually in London; but these may be quite reasonable computations of the syphilitic population of each city. This sort of misapprehension has introduced confusion into the figures given in this paper.

These, however, are the defects of a popular writer. We are, on the whole, glad that these papers have been written; and the attitude of mind exhibited in the closing pages is eminently reasonable. He looks to education of the public and the introduction of better facilities for treatment as the two great lines of advance; and in this we feel sure he is right.

SOCIOLOGICAL REVIEW. Vol. VII., No. 1. April, 1914. *Abnormal Psychology*. Professor William Brown. Pp. 37-49. In a rather disjointed paper, the author refers to several well-known phenomena associated with abnormal psychology—hysteria, automatic writing and double personality, as well as hypnosis and the "hypnoidal" state. He believes that "functional diseases are produced by mental causes, and can be cured by mental means." Dr. Morton Prince's case of Miss Beauchamp, from whose personalities he was able to obtain some important introspective records, is outlined; and in addition, the author gives the theory of Freud, that wishes repressed in early childhood may re-appear in later life as the material of hysteria. These repressed wishes are realised in the dreams of normal subjects, for during sleep the censor of consciousness is not able to prevent their appearance, but can only disguise them, so that they fulfil a counter-wish formed by the waking self against the unwelcome desire.

H. O.

NATURE. Vol. 93. No. 2,321. April 23rd, 1914. *Mutations of Bacteria*, by R. T. Hewlett.

This is a note mentioning various methods of altering the morphology and the physiological characters of certain bacteria, especially the observation made by Mme. Victor Henri of the fact that *B. anthracis* can be very materially affected by subjecting the sporing bacillus to ultra-violet light in a quartz tube.

UNITED EMPIRE. *The Royal Colonial Institute Journal*. Vol. V., No. 5. May, 1914. *The Empire and the Birth-Rate*. By C. V. Drysdale, D.Sc. Pp. 398-416.

This paper examines the facts as to the almost universal decline of the birth-rate in civilised countries, and tries to correct certain popular ideas with regard to this decline.

The writer has deduced from his investigations the existence of a law, which he calls "The Law of Correspondence between Birth and Death-Rates." In support of this deduction he gives the figures of the birth-rates, general death-rates, and infant mortality rates in various countries. (It should be noted that in this case the infant mortality rate is not put in the usual form, as so many deaths per 1,000 births in any given year, but as so many infant deaths per 1,000 of the whole population, which gives very different results.)

These figures are mostly given in the form of a very simple diagram, showing the birth-rate, death-rate, and infant mortality rate, per 1,000 of the population, one above the other, each being differently coloured, so that the rate of natural increase (the excess of births over deaths) is easily seen at a glance.

Dr. Drysdale claims to be a strong Imperialist, and he devotes the greater part of his paper to the consideration of the position of the various parts of the British Empire with regard to this natural increase of population, afterwards comparing its position as a whole with that of the other important nations, to the advantage of the Empire.

He argues that the facts go to show that neither a rapid increase of population nor a high standard of national efficiency is secured by a high birth-rate. A high birth-rate means a high death-rate, and if this is checked by humanitarian legislation the result is a "process of reversed selection." He believes that the question is largely one of food supply, so that an increase of food production rather than of the birth-rate is the end to be aimed at.

He also advocates the limitation of families, especially among the poorer classes, and quotes the case of Holland, where an organisation for this object has been in existence since 1881, to prove that such a policy quickly produces improvement in national prosperity and national physique, besides an actually accelerated rate of natural increase.

The paper was followed by a discussion, most of the speakers on the whole agreeing with Dr. Drysdale's conclusions, though some of them thought they needed qualifying.

FOREIGN.

ARCHIV FUER RASSEN- UND GESELLSCHAFTS-BIOLOGIE, IX., 5; September-October, 1913 (issued March 6th, 1914).

W. Weinberg: *Auslesewirkungen bei biologisch-statistischen Problemen*, II. (p. 557-581). A continuation of the author's exposition and discussion of his methods of compensating for the effects of social selective factors (influences of the environment) and for such errors as result from the personal equation and its "artificially selective action" in the collection and interpretation of statistical material bearing on problems of heredity. For example, when a transmitted character appears with different intensity in different individuals, the more evident cases are apt to be first seen and noted and the less evident overlooked, and the same applies to families in which many members are bearers of a particular character as compared to families in which only one member is affected. The possibility must also be considered that when a character is manifested with great intensity in a family, there are more individual bearers of it than in the average affected family. It is further evident that such characters as seldom appear until a certain age has been reached, and which become manifest as a result of the mutual action of inciting

external forces and complex transmitted factors of unknown number, must vary greatly in intensity and are frequently passed over unnoticed. Weinberg shows that the study of biological problems by the statistician leads to the discovery of sources of error which are hidden from purely individual and clinical methods of research and to the recognition of the necessity of compensating for the effects of external, especially social, influences on the development of transmitted characters. He strongly recommends a national organisation for research into problems of heredity.

W. Claassen : *Rekrutierungsstatistik des Deutschen Reiches, 1902-1913, und Friedenspräsenzstärke* (p. 582-585). In accordance with the provisions of the new German defence law, the peace strength of the German army and navy has been increased by 120,000 men. It is claimed by some military authorities that this has been done without lowering the physical standard of fitness. Claassen shows that unless the percentage of fitness has suddenly risen by $\frac{1}{4}$ per cent., which is not probable, in view of the fact that it sank over 3 per cent. during the eight years preceding 1911, this cannot well be the case.

Julius Wolf : *Religion und Geburtenrückgang* (p. 586-594). An answer to certain writers who deny the influence of religion on the birth-rate. Practically all religions encourage the propagation of the race, but the Roman Catholic Church, by reason of its explicit condemnation of the use of preventives and its greater control over the individual, is able to bring a more powerful influence to bear from this point of view than the other confessions. Lutheranism, in spite of its "Catholic" sexual morality, is, in Dr. Wolf's opinion, less favourable to a high birth-rate than Catholicism, and this is mainly due to the absence of the confessional. That the influence of religion is small in the centres of industry is generally recognised, and that this finds its inevitable expression in the birth-rate can be statistically proved, although great care must be taken to isolate the religious from the many other factors involved.

Dr. Grassl : *Der Erfolg alter und neuer ehelicher Geschlechtssitten in Bayern* (p. 595-627). An interesting if not wholly convincing paper by a well-known opponent of Neomalthusian and feminist doctrines. Grassl considers that if one allows for two years between successive births and for the fact that a large number of women marry at a later age than twenty-three years, that ten is the normal number of children born to a Bavarian woman who nurses her own offspring. He views with evident alarm the headway which Neomalthusian practices are making in the country districts, where the fertility of the average marriage used to be considerably greater than it is to-day, and he differs from many competent authorities, including the statisticians of the Bavarian Home Office, in refusing to believe that a high birth-rate and its accompanying high rate of infant mortality is either wasteful over-production or an injury to the health of the race. On the contrary, he endeavours to prove that a high birth-rate is an unmixed blessing, that the districts in which the greatest number of children are born relative to the number of women of marriageable age supply the largest proportion of recruits fit for military service, and that the Boers and the Bulgarians, the Russians and the Poles, the Servians and the Turks and other prolific peoples of Eastern Europe are of a higher average physique than the men of Western Europe. Dr. Grassl suggests that women should be enabled to work less in order that they may have more energy to devote to child-bearing, and proposes that in the grain-raising districts the authorities should see to it that during the winter, the men, who are then for the most part idle, should take upon their own shoulders the duty of caring for the live-stock instead of letting their wives do it as heretofore. Mothers should be advised and assisted (by lightening their labour) to nurse their children for a full year, so that beyond taking advantage of the usual temporary sterility during the period of breast-feeding no attempt need be made to limit the number of offspring. Public institutions

for the care of infants are an evil, because they encourage mothers not to nurse their children. "The ancient and medieval custom of limiting marriage to the physically and mentally fit, of taking the fullest advantage of such selected married couples as producers of children, and especially of the wife as *Vollmutter* who nurses her infants for at least a year, would do far more towards safeguarding the existence and the anthropological and consequently social development of the population than the modern customs of high frequency of marriage, the limitation of the size of individual families, and the bringing up of the child without the physical and often without even the intellectual assistance of the wife as mother." Although much of what Grassl says is quite to the point, especially his insistence on the importance of breast-feeding, it is obvious that the question of the birth-rate cannot be satisfactorily dealt with unless one has as thorough a knowledge of the economic, social and psychological factors that determine its fluctuations as of its more purely medical and biological aspects.

Dr. Fritz Lenz: *Rassewertung in der hellenischen Philosophie. I. Der Kynismus* (p. 628-644). Antisthenes, and Plato, whose teaching was greatly influenced by Antisthenes, were the most consistent expositors of race hygiene among the Greek philosophers, and their sympathies were with the aristocratic and patriarchal ideals of the Spartans rather than with Athenian democracy and cosmopolitanism. Antisthenes taught that civilisation, with its loss of natural conditions of life and its mating of the strong and capable with the inefficient and weak, inevitably leads to racial decline. Some of his characteristic utterances were, "the object of marriage is not the enjoyment of love, but the rearing of children," "only the wise man knows whom he should love and marry," "agriculture, pastoral pursuits, hunting and war are the vocations of strong men." The apparent contradiction between the contempt of pleasure of the Cynics and the Dionysiac elements of the popular religion of the period was removed by intellectualising the latter. Lenz thinks that the eugenists of the future will be neo-Cynics.

HENRY BERGEN.

ZEITSCHRIFT FUER INDIKTIVE ABSTAMMUNGS- UND VERERBUNGSLEHRE.
Bd. xi. Heft 4. March, 1914. *Breeding Experiments which show that Hybridisation and Mutation are Independent Phenomena.* R. R. Gates. Pp. 209-279. This paper describes the results attained by crossing different forms of oenothera. The conclusions at which the author has arrived are of great importance. Mendelians have suggested that all new characters originate through the loss and recombination of unit characters. The author claims to have shown that some mutations "owe their origin to a cause which is independent of the mere mingling of characters in hybrids. He concludes that "the combination and sorting of characters which exist is one problem, and the origin of those characters, whether it be sudden or gradual, is another. These two problems must be kept in separate categories, for Mendelians misinterpret the facts and confuse the issue when they assert that the latter are in any way included in the former. Any clear view of the facts now known must lead to the conclusion that the origin of new characters is one question, and their hereditary behaviour after they have originated is another." He further claims to have shown that unit characters are capable of modification contrary to the view generally held by Mendelians.

Erblichkeitsstudien an Schmetterlingen. II. R. Goldschmidt and H. Poppebaum. Pp. 280-316. Two years ago the first-named of these two authors published in this journal the results obtained by crossing *Lymantria dispar* with *L. japonica*. Various gynandromorphic forms appeared and the results were interpreted on the supposition that not only were factors for sex and secondary sexual characters present, but that these factors differed in potency. Further experiments have been undertaken to test this supposition, and it is claimed that it holds good.

Studien an gynandromorphen Schmetterlingsbastarden aus der Kreuzung von Lymantria dispar L. mit japonica Motsch. H. Poppelbaum. Pp. 317-354. This study of gynandromorphism was suggested by the facts discovered in the previous paper.

ZEITSCHRIFT FUER INDUKTIVE ABSTAMMUNGS- UND VERERBUNGSLEHRE. Bd. xii. Heft 2. April, 1914. *Über alternative Vererbung bei Kreuzung von Cyprinodontiden-Gattungen.* M. W. Gerschler. Pp. 74-96. This paper describes the results obtained by crossing the genera *Xiphophorus* and *Platypoecilus*, both of which are sexually dimorphic. The bastards at first sight present the appearance of blending, but upon further analysis of individual characters show alternative inheritance. The sexual dimorphism enables an analysis of the nature and inheritance of sexual characters to be made. A complicated formula is arrived at which differs from those given by Bateson and Goldschmidt.

Duplicate Genes for Capsule-Form in Bursa bursa-pastoris. G. H. Shull. Pp. 97-147. These experiments form another example of that type of Mendelian inheritance first discovered by Nilsson-Ehle, in which the same apparent or "Phenotypic" character can be produced independently by any one of several Mendelian factors which are not allelomorphic to one another. These experiments have reference to the shape of the capsule in *B. bursa-pastoris*, which may be either triangular or top-shaped; the first is shown to be due to either one of two independent determiners. The author distinguishes sharply between "plural" and "duplicate" determiners; according to him the presence of "duplicate" determiners has now been proved for the presence of a ligula in oats, red pericarp colour in wheat, yellow encosperm colour in maize, and the triangular capsule form in *Bursa*.
A. M. C.-S.

EUGÉNIQUE, March, 1914. *Transmission Héréditaire d' Attributs Psychologiques dans deux Familles Gallo-celtes de Même Souche observées pendant Quatre Siècles*, by Dr. Oriou. Pp. 65-69. This is a brief account of a study published in the *Revue de Bretagne et de Vendée* in June and July, 1913. The author has studied biographically the descendants of two Frenchmen derived from the same Irish stock, who differed essentially in character. The same differences distinguished their descendants for eight generations.

Sur la Réceptivité Héréditaire relative des Ainés et des Cadets, by M. Lucien March. Pp. 70-83. M. March describes in simple language methods for avoiding statistical pitfalls in studying such problems as the comparative fertility of degenerate and normal stocks and the relative liability of first-born and later-born members of families to defects. The special case of tuberculosis is discussed as an example, and reference is made to the criticisms of previous work on this subject contained in memoirs by Dr. Greenwood and Mr. Yule (*Journal of the Royal Statistical Society*, January, 1914), and by Dr. Weinberg, *Archiv für Rassen-und Gesellschafts-Biologie*, 1913, Heft 1.

EUGÉNIQUE, April, 1914. *Les Infirmités Mentales en Angleterre et l'Act de 1913*, by M. Lucien March. Pp. 108-118. M. March discusses the increase in numbers of the insane as shown by census returns in the British Isles and in France, and explains the provisions of the Mental Deficiency Act. He concludes by demanding fresh legislation in France to deal with mentally defective persons of all grades, legislation which should have for its objects the protection of these persons and the utilisation as far as possible of their faculties, the protection of their sane fellow citizens as well as of the race.

BULLETIN DE LA STATISTIQUE GÉNÉRALE DE LA FRANCE. Tome III., Fasc. III. April, 1914. *La Fécondité des Femmes suivant leur origine aux Etats-Unis.* P. 253. A summary of the results obtained by Mr. J. A. Hill from the census returns of the state of Rhode Island, published

in the Journal of the American Statistical Society. Figures of the same nature based on the 1905 census were communicated by Mr. Hoffman to the Eugenics Congress (*Problems in Eugenics*, p. 334.)

Influence des conditions du travail de la mère sur la mortalité de la première enfance aux Etats-Unis. Pp. 253-256. From The Report on Condition of Woman and Child Wage-earners in the United States, Vol. XIII. Infant Mortality and its Relation to the Employment of Mothers, by Mr. E. B. Phelps. Although it is difficult to disentangle the various factors to which excessive infant mortality might be due, the figures obtained by comparing towns in Massachusetts, in which it is high, with those in which it is low, appear to indicate that a high birth-rate, a high proportion of foreign born mothers and illiteracy are more closely related to a high rate of infant mortality than the employment of mothers outside their own homes. The foreign-born mothers for the most part belong to the very poorest classes, so that in general there is some ground for the conclusion that the fault lies more with extreme poverty and ignorance than with married women's employment.

Budgets de Familles en Divers Pays, by M. L. Dugé de Bernonville. Pp. 297-336. The author first discusses the methods which have been adopted in ascertaining the manner in which working-class incomes are spent, and then summarises such enquiries as have been made on this subject in different countries. Certain general conclusions emerge. For example, as the income increases the amount spent on food increases absolutely, but decreases relatively. The relative amount spent in rent remains about constant, but that on clothing and such things as amusement and intellectual needs increases. The nature of the food eaten changes so as to include more meat and less bread and potatoes. With an increase of the number of mouths to feed goes a very slight restriction of the amount consumed; but the proportion spent for each adult man falls considerably. It also appears that in most cases the conditions are capable of amelioration by a more judicious expenditure of the available income.

E. H. J. S.

REVUE DE PÉDOTECHNIE, 1re Année, No. 1. October-November, 1913. This is the first number of a new journal, whose aim is to deal with the scientific study of the child and its practical applications. It is published by the Société Belge de Pédotechnie with the collaboration of the Institut J.-J. Rousseau (Geneva). The director of the editorial committee is Dr. Decroly.

Les Notes Scolaires ont-elles une Valeur Pédotechnique? Ed. Claparède. Pp. 9-20. The writer concludes that, providing the marking is scientifically carried out, and provided aptitude is estimated distinct from zeal, schoolmarks constitute a source of information which is indispensable to the teacher. Employed as a method for stimulating activity, they are only justified if they form a means of permitting the pupil to know himself, to understand and interest himself in his own mental progress.

Les Classes Homogènes et l'Examen Mental par la Méthode des Tests de Binet et Simon. Dr. Decroly. Pp. 21-44. The present article consists mainly of a brief discussion of certain advantages and limitations of the Binet-Simon tests. A further article is promised containing the results of an application of the tests to irregular or abnormal children.

L'ENFANCE ANORMALE, No. 25, January, 1914. *Le Témoignage des Normaux et des Aliénés (suite et fin).* Drs. Ley and P. Menzerath. Pp. 3-13. The article continues the description of a series of experiments upon the testimony of normal and abnormal subjects of different types; and gives a concise summary of the chief conclusions reached in the psychology of testimony, with special reference to that of defectives and the insane.

Les Arriérés Scolaires d'après un Ouvrage Récent (suite et fin). Dr. Armand Laurent. Pp. 14-20. A critical review of a medico-psychological

publication of joint authorship dealing with various aspects of abnormal children.

C. B.

ARCHIVIO PER L'ANTROPOLOGIA E LA ETNOLOGIA. Vol. xliii., 1913, No. 3. This periodical, published under the auspices of the Italian Society of Anthropology and Ethnology, contains *inter alia* a serious study of fingerprints, their classification, and the question of their transmission by heredity. Prof. Dalla Volta, the writer, bases his conclusions mainly on the results obtained by comparing the fingerprints of the members of one hundred families (fingerprints, not thumbprints only), including six cases of three generations. These were normal individuals drawn from various classes of society. The article, with its numerous tables and photographic reproductions of fingerprints (too often somewhat blurred), gives evidence of very careful research, but it is perhaps doubtful whether the data justify the generalisations somewhat elaborately deduced. Few, however, will quarrel with the general conclusion that heredity counts and that the influence of one parent is not more marked than that of the other.

H. R.

THE POPULAR SCIENCE MONTHLY. Vol. LXXXIV., No. 4. April, 1914. *Eugenics and Euthenics*, by Prof. Maynard M. Metcalf. Pp. 383-389. Prof. Metcalf claims that human progress has been entirely cultural, and while fully recognising the social value of efforts directed to the advance of culture, in its widest sense, urges the importance of improving eugenically the innate mental, moral, and physical qualities of man. He believes that mendelian analysis will ultimately supply the knowledge requisite for this purpose and pleads for patience, but not for inaction, while the knowledge is being acquired. As an immediate policy he urges caution in legislation, the promulgation of eugenic ideals of marriage, and the collection of data for the study of human inheritance. The latter purpose will be the more readily attained the more the public is taught to realise the potential value of eugenics.

The Psychological Limit of Eugenics, by Professor H. A. Miller. Pp. 390-396. Professor Miller is a sociologist and much afraid of eugenics. "If eugenics succeeds in establishing in the popular mind the tremendous social value of heredity that it is trying to establish, it will overthrow a mass of valuable work of the last decade which has been pointing the way to a fundamental solution of many of our social problems." So he proceeds to limit its scope by disputing the inheritance of mental and moral qualities. The following misquotation meets with his approval: "'Heredity' is the chief explanation tyros offer for any collective trait that they are too stupid or too lazy to trace to its origin in the physical environment, the social environment or historical conditions." In spite of this Professor Miller admits that there is a great deal of good in the eugenic movement. He is quite within his rights in criticising some of the exaggerations and dogmatic statements made by certain of its exponents.

The Racial Origin of Successful Americans, by Dr. F. Adams Woods. Pp. 397-402. From a study of the frequency of different surnames in *Who's Who in America*, Dr. Woods concludes that "In the four leading American cities, New York, Chicago, Philadelphia and Boston, it is safe to say that at the present time, those of English and Scottish ancestry are distinctly in possession of the leading positions, at least from the standpoint of being widely known, and that, in proportion to their number, the Anglo-Saxons are three to ten times as likely as other races to achieve positions of national distinction."

THE JOURNAL OF HEREDITY. Vol. V., No. 2. February, 1914. *Injuries to the Germ Cells*, by Dr. C. R. Stockard. Pp. 58-64. (Abstract of an article in the *American Naturalist*, November, 1913.) Dr. Stockard's experiments are already well known, and have been much quoted in the consideration of the effects of alcohol on the germplasm. They consist in

rearing young from guinea-pig matings of the following four classes : (1) Alcoholised male \times normal female; (2) normal male \times alcoholised female; (3) alcoholised male \times alcoholised female; (4) control experiment, normal male \times normal female. The alcoholised parents were made to assume this condition by being subjected daily to the fumes of alcohol until they had reached a certain condition of intoxication. Dr. Stockard rightly considers the experiments in Class 1 to be of the greatest theoretical importance, since in Classes 2 and 3, where the mother was drugged, it is impossible to decide whether the effect of the alcohol is on the developing embryo or on the germplasm. Fifty-nine matings of Class 1 have reached term. Twenty-five of these gave negative results or early abortions. Thirty-four resulted in conceptions which ran the full term. Eight, or about 24 per cent., of these were still-born litters containing in all 15 dead individuals. Many of them were somewhat premature. Twenty-six, or only 44 per cent., of the matings produced litters of living young, containing a total of 54. Twenty-one, or almost 40 per cent., of these young animals died within a few days or less than four weeks after birth, and only 33 of them survived. Only one still-born litter occurred in 35 control matings.

Mendelism in Great Britain, by Professor Punnett. Pp. 86-89. A brief account of the establishments in Great Britain at which experimental work on mendelian lines is being carried out, and of the nature of the work.

THE JOURNAL OF HEREDITY. Vol. V., No. 3. March, 1914. *Pure Lines and Selection*, by Prof. W. E. Castle. Pp. 93-97. Professor Castle discusses briefly and lucidly the evidence for and against the habitual occurrence of "pure lines" of animals or plants within which selection for reproduction can effect no racial change of characters. He concludes that no adequate proof of their occurrence has yet been brought forward, and what appears to be direct evidence to the contrary exists in his own experiments with the hooded pattern of spotted rats (a mendelising unit character). "The experiments show that plus selection and minus selection are both effective, and that selection away from and back to any modal condition are equally easy of accomplishment."

Marriage Selection, by Prof. R. H. Johnson. Pp. 102-110. Professor Johnson considers the reasons which prevent men and women of the educated classes from marrying, or cause them to marry late. He suggests various expedients for promoting earlier marriages, including a shortening of the time of preparation for the learned professions and the provision of the right number of dances (not too few or too many) for each individual.

Tests for Mental Defects, by Howard A. Knox. Pp. 122-130. Mr. Knox is assistant surgeon in the United States Public Health Service at Ellis Island, New York, and thus has before him the problem of judging the mentality of immigrants as speedily and accurately as possible in order that the federal law against the immigration of mentally defective persons may be enforced. In choosing a series of tests that should be applicable to a large variety of people of different ages speaking different languages, he has followed Binet and Simon in devising an age scale of intelligence, but the performances demanded from the subject at each age are less dependent on the subject's knowledge of language. A favourite type of test follows the main idea of the jig-saw puzzle. The simplest of these which he employs should be done by normal children of six years of age, the most complicated by children of twelve. A fuller account of these tests is to be published in the *Journal of the American Medical Association*.

THE JOURNAL OF HEREDITY. Vol. V., No. 4. April, 1914. *Differential Fecundity*, by Prof. W. F. Wilcox. Pp. 141-148. In this address,

which was delivered before the first National Conference for Race Betterment, at Battle Creek, Mich., on January 10th, 1914, is contained a brief review of the data available for ascertaining the relative rate of increase of various racial constituents in the American population. Considering the importance of the question, the slenderness of the data is remarkable, and is due largely to the fact that much raw material which might be turned to service is not available because the United States census returns of 1890, 1900, and 1910 have never been tabulated so as to throw light on the problems connected with fertility. The Immigration Commission, in its report for 1911, utilised a fraction of this material and arrived at the following conclusions dealing with married women under 45 years of age. "Of the negro wives who had been married between 10 and 20 years, one in five had had no child; of the native white of native parents, one in eight; of the native white of foreign parents, one in 16; and of the foreign-born wives, one in 19. The proportion of sterile marriages among the foreign-born is highest among wives born in Scotland or England; lowest among wives born in Poland, Bohemia or Russia." "With reference to the average number of children born to these groups of wives of various countries of birth, the smallest number is to wives of native American birth and parentage. Ten such marriages have resulted in 27 children. Ten negro marriages in 31 children; 10 marriages in which the wives were born in England, in 34 children; and at the other extreme, 10 marriages with wives born in Russia, in 54 children; 10 with wives born in French Canada, in 56; and 10 with wives born in Poland, in 62." The results agree in general with the results of investigations made in certain individual states such as Massachusetts, New Hampshire, New York and Rhode Island. As there appears to be little difference in the mortality of the native and foreign-born, the differences in birth-rate really indicate differences in the natural rate of increase. The negro death-rate is, however, much higher than that of whites and the natural rate of increase appears to be lower and to be falling at a more rapid rate, thus the colour question may solve itself automatically by the extermination of the negro.

Eugenics in the Colleges. P. 186. There are now 44 colleges in the United States giving either a complete course in eugenics or some lectures on it as part of another allied course; 15 in the East, 14 in the middle West, four in the South. Sixteen teach it in their zoology department, 11 in the biology department, and 11 in the sociology department.

E. H. J. S.

THE TRAINING SCHOOL BULLETIN, XI., 2, April, 1914. *The Problem of the Moral Defective.* Samuel C. Kohs. Pp. 19-22. The writer briefly discusses the following problem: "What is there to support the belief that moral defectiveness is only a symptom of mental defectiveness?" "Everyone," he observes, "working with the problem of juvenile delinquency is crying for more facts." The article would have been more satisfactory if the writer had from his experience given us more facts, on the lines of a recent discussion of the same problem in the Genevan *Archives de Psychologie*, or of previous experimental contributions in the *Bulletin*. He classifies moral obliquity quite *a priori* into three groups: that due to lack of control; that due to poor judgment; and that due to a combination of both. He concludes: "It would seem that the only ones we can really hope to redeem are those lacking in moral judgment alone."

Mentally Deficient Children. George D. Auden. Pp. 23-25. (Extract from a report presented to the Birmingham Education Committee by the Chief School Medical Officer.) In this excellent little paper, the writer develops certain theoretical considerations, based on Professor Spearman's hypothesis of two factors (general intelligence and special faculties) and discusses their practical application to the examination of mentally deficient children.

C. B.

BULLETIN OF THE AMERICAN ACADEMY OF MEDICINE. Vol. XV., Nos. 1 and 2. February and April, 1914. These numbers contain further instalments of the papers read at the thirty-eighth annual meeting of the Academy held at Minneapolis in June, 1913. Dr. Edith Spaulding and Dr. William Healy contribute an interesting study of the hereditary factor in crime, based on the examination of 1,000 young recidivists referred for report to the Juvenile Psychopathic Institute of Chicago. Excluding cases where the family history was defective, the authors worked out in detail the personal and hereditary data in 668 of these criminals. In 245 cases they found distinct evidence of mental deficiency or epilepsy in the offenders. The remainder comprised 271 cases in which there was no known criminality in earlier generations, and 152 cases in which there was a history of ancestral criminality. Each of these latter cases was carefully analysed with a view to establishing the possible causative factors of delinquency, and in all but 15 cases it was ascertained that in environmental conditions or in hereditary influences apart from criminality there was adequate explanation of anti-social conduct. Even in the 15 cases where a direct inheritance of criminal tendency might be suggested as possible, the authors considered it very improbable. On the other hand, they found ample evidence of an indirect inheritance of such tendency through conditions of nervous defect and disorder, epilepsy, insanity, and feeble-mindedness. Their conclusion is that a direct inheritance of criminalistic traits as such does not occur. The paper is illustrated by pedigree charts of a number of the cases. Dr. Newkirk, who writes from his experience as surgeon to the Hennepin County Juvenile Court of Minneapolis, puts forward the very reasonable view that physical defect, while, of course, of very secondary importance in comparison with bad environment or faulty heredity, may nevertheless have a part in predisposing to crime when, for instance, adenoids or errors of refraction act as a further cause of strain to an unstable, over-irritable nervous system. In a paper on "Social Factors Affecting the Volume of Crime," Professor Gillin refers to the influence of divergent legal systems in the different states of the union as tending to decrease respect for law and so to diminish one of the chief forces of social restraint. As bearing on the same point, he mentions the very interesting fact that, while the criminality of immigrants into the United States is not notably high, the criminality of the children of immigrants is excessive. It has been found, for instance, that of the delinquent children brought before the Juvenile Court in Chicago in the ten years, 1899-1900, 72·8 per cent. were children of foreign-born parents. The cause of this higher criminality may be sought in the dissolving influence of the new moral environment on the social traditions and standards of the home. On the question of the value of imprisonment, the author adopts a somewhat neutral attitude that prisons have little effect either in manufacturing criminals or in curing them. While specially emphasising the importance of economic conditions in determining the movement of crime, Professor Gillin recognises also to the full the part which belongs to the individuality of the criminal, and on this point he agrees with Dr. Goddard, who contributes a separate paper on the subject, in estimating the proportion of mental defectives in the delinquent class as at least 25 per cent. The aspects of the problem dealt with in the other papers are for the most part of less direct interest to eugenists.

W. C. S.

QUARTERLY CHRONICLE.

CENTRAL SOCIETY.

April 2nd.—At the Grafton Galleries, 5.15 p.m., Dr. E. C. Snow on "Evidences of the Operation of Natural Selection in Man." Chairman, Major Leonard Darwin.

April 28th.—Dr. Simon before the Eugenics Education Society on "La Mesure de l'Intelligence," at Burlington House (by kind permission of the Royal Society).

May 7th.—At the Grafton Galleries, 5.15 p.m., Dr. J. Cowper on "Eugenics as a Basis of Hope." Chairman, Major Leonard Darwin.

June 4th.—At the Grafton Galleries, 5.15 p.m., Dr. C. W. Saleeby on "The National Birth-rate Commission." Chairman, Mr. Newton Crane.

July 2nd.—At the Grafton Galleries, 3.30 p.m., the Annual General Meeting, followed by a Reception by the President and Mrs. Leonard Darwin.

COMMITTEES.

May 15th.—Executive Council Meeting.

„ 15th.—Informal Council Discussion, 12, Egerton Place. Subject, "Is it for or against the Interests of Eugenics to bar the Employment of Married Women in the Teaching and Other Professions?"

June 17th.—General Council Meeting.

MEETINGS.

March 26th.—Miss Norry before the Walton Women's Club on "Eugenics and Social Problems."

April 1st.—Miss E. Corry before the Society of the Spoken Thought, Blackheath, on "Some Aspects of Eugenics."

April 17th.—Mrs. Penrose at the Children's Welfare Exhibition on "Eugenics in the Home."

April 29th.—Dr. Ham at the National Conference of Nurses and Midwives at the Horticultural Hall, on "The Influence of the Nursing Profession in the Prevention of Venereal Disease."

May 6th.—Mrs. Gotto at the Day Nursery for Jewish Infants, Commercial Road, E., on "Eugenics."

May 27th.—Major E. H. Hill on "The Permanent Care of the Feeble-Minded" at a Drawing Room Meeting, Minehead, on behalf of a proposed Farm Colony for Bristol and Somerset.

At the invitation of the Victoria League the Society sent an exhibit of charts and literature to the Imperial Health Conference and Exhibition organised by them at the Imperial Institute from May 18th to 24th.

June 16-17th.—Dr. D. White represented the Society at the Portsmouth Conference of the International Abolitionist Federation, a report of which will appear in the next number.

LIVERPOOL BRANCH.

The Council met on May 26th and nominated Alderman Bulley, Mr. Laurie, and the Hon. Secretary to represent the Branch on the General Council. Only one meeting has been held since the last quarterly report; Mr. D'Aeth read a paper on March 31st on "Personal Qualities in Relation to Eugenics," giving a tentative classification of human qualities as manifested in behaviour; discussion followed upon the heritability of such qualities and the extent to which they may be influenced by training.

Outside our own series, an important lecture was delivered in St. George's Hall by Professor Karl Pearson, F.R.S., on "Some Aspects of the Problem of the Relative Intensity of Nurture and Nature." The Medical Officer of Health for the City of Liverpool presided. The lecture was concerned largely with official records of Liverpool children furnished for

the purpose; the records of several other towns of the North were also laid under contribution. The general conclusion was that the effect upon infant mortality of rent, wages, type of house, ventilation, sanitation, employment of the mother, etc., was in each case considerably less than that of the parental health and habits, the heritable factors.

R. T. BODEY, Hon. Sec.

Eugenics and Elementary Education.—In recent years the Society has urged the introduction of adequate training in sex-hygiene into the training colleges, it has approached the authorities on various occasions, and in March last year organised a conference of head masters and mistresses, at which a resolution was passed asking for an enquiry as to the advisability of introducing eugenics into the educational systems. The report which has just been issued by a special section of the Elementary Education Sub-Committee of the London County Council is therefore of special interest to the Society. This section were instructed, in April, 1913, to consider what action, if any, could be taken with reference to the question of instruction in sex-hygiene and purity in the public elementary schools. After hearing the evidence of head masters and head mistresses, school doctors, and others, they concluded that under no circumstances should sex-hygiene be taught in class in elementary schools, the main grounds being the different types of homes from which the children came, the varieties of temperament to be met with, and the danger that the children's natural modesty and reticence might be broken down, and that as the result of such teaching undesirable conversations would take place. This last opinion was endorsed by head teachers and all witnesses except one. A large proportion of the witnesses were in favour of individual talks to boys and girls on leaving school. Though not, therefore, recommending the inclusion of sex teaching as a class subject, the committee arranged for consideration to be given (1) to the importance of the subject of sex-hygiene during the early adolescent stage, and to the possibility of suitable guidance being given in connection therewith to students attending the evening institutes; and (2) to the advisability of making provision for teachers in training to receive some advice which will enable them to deal with undesirable habits in the children entrusted to their charge.

The opinions here expressed seem to be in general agreement with those of the National Union of Teachers, who, at their conference at Lowestoft in April, passed a resolution "That in view of the increasing attention given to it by the Press and educational bodies in this country, the conference is of opinion that instruction in the subject of sex-hygiene should be a part of every teacher's equipment, and to insure this it should become a part of the curriculum in all training colleges both for men and women." The question had been previously considered by the Ladies Committee of the Executive, who had decided that it was neither practicable nor desirable to give class instruction in the subject, but that it might with advantage be taken up by the students in the training colleges.

Galton Day in New South Wales.—The Eugenics Education Society in New South Wales gave a dinner during February last in commemoration of the birth of Sir Francis Galton. The State Governor, Sir Gerald Strickland, was the guest of the evening, and in replying to the toast of his health, spoke of the science of eugenics and the part to be played by the Society. Eugenics he likened to the Chinese ancestor worship or to the English and Scottish love of pedigrees lifted into a higher plane. Professor A. Stuart said "The Eugenics Education Society intended to put before the people of Australia the conditions of human life as to heredity on the one hand and environment on the other, which would act and react and act again upon the individual. If man was to be a rational being and not altogether an irrational character, a certain amount of consideration would greatly tend to the well-being of the race." Professor R. F. Irvine, of the University

of Sydney, spoke next. He was not of opinion that the human race could be improved by legislative enactments in the present state of our knowledge, and he disputed views expressed by certain biologists that the environment was an unimportant factor. His remarks appear to have been reported in a form which gave rise to some misconception as to his real views, and so he stated them again clearly in a letter to the *Sydney Morning Herald* of February 26th. Here he expressed himself as completely in accord with the main objects of the Society, but insisted that the problem of how to produce a superior civilisation is both biological and sociological. It is a matter of breeding on the one hand, and a matter of social organisation and adjustment on the other. The two aims must go together if valuable results are to be arrived at. Professor Irvine's letter was followed on March 3rd by a letter to the *Daily Telegraph* (Sydney) by Mr. J. C. Eldridge, the Secretary of the State Labour Bureau in New South Wales, who is the Secretary of the Eugenics Education Society of New South Wales. He explained that Professor Irvine's contention was fully admitted by the Society, who, if they insist on the importance of heredity, do not do so by belittling environment, but aim at strengthening all agencies which may improve the human race.

Medical Inspection of School Children in New South Wales.—We have received from Mr. J. C. Eldridge full particulars of the medical examination of school children which has been instituted there. Each school is apparently to be examined about once in four years. The particulars ascertained about each child are entered on a separate card. They are provided partly by the child's parents or guardian, partly by the teacher, and partly by the school doctor as a result of the medical examination. The parents are asked to give information concerning (1) the number of children of each sex, living or dead, in the family; (2) the child's place in order of birth; (3) their own occupations and nationality, and the nationality of their own parents; (4) any family history of consumption, rheumatism, heart disease or nervous trouble; and (5) certain particulars concerning the health of the child. The teacher measures the height and weight and chest of the child, records the hair, eye and skin colour, gives an estimate of mental capacity in comparison with other children of the same age, and ascertains something of the home conditions, hours of sleep and of work in or out of school, and notes the nature of the clothing and anything of interest in the physical characters of the child. The actual medical inspection seems fairly comprehensive and if all the data obtained from the parents, teachers and doctors could be thoroughly relied on, a mass of data valuable for ascertaining something of the conditions associated with physical and mental defects would be obtained.

The Second International Eugenics Congress will be held at the American Museum of Natural History, New York City, September 23rd to 28th, 1915. The organisation, as thus far completed, stands as follows: Alexander Graham Bell, Honorary President; Henry Fairfield Osborn, President; Madison Grant, Treasurer. Executive Committee: Henry E. Crampton, Chairman, Professor of Zoology, Barnard College, Columbia University, and Curator, American Museum of Natural History; James McKeen Cattell, Professor of Psychology, Columbia University; Chas. B. Davenport, Director of the Station for Experimental Evolution, Carnegie Institution of Washington, and Resident Director of the Eugenics Record Office, Cold Spring Harbour, L.I.; Franklin H. Giddings, Professor of Sociology, Columbia University; August Hoch, Director of the Psychiatric Institute, Wards Island; Edmund B. Wilson, Professor of Zoology, Columbia University; Frederick Adams Woods, Brookline, Mass.; Arthur E. Hamilton, Secretary, Extension Department, Eugenics Record Office. There is in addition a strong General Committee containing many well-known men of science and other influential people, and there is every prospect that an interesting and successful gathering will be organised.

Eugenics at the Italian Congress of Science.—The Italian Committee for the Study of Eugenics has approached the governing body of the Italian Society for the Progress of Science with the suggestion that there should be henceforward a eugenic section at their annual congress. In consequence a section has been arranged for their next meeting at Bari in October. Professor Sergi, President of the Eugenic Committee, is giving the inaugural address.

Eugenics at the Manchester School of Technology.—At the request of the Manchester branch of the Society, Mr. Maxwell Garnett, Principal of the School of Technology, arranged a series of lectures to be delivered there if an audience of 15 people could be guaranteed. As double that number have entered, the course is in progress, Dr. D'Ewart being the lecturer. The Society has made a small grant towards the payment of students' fees, as those imposed by the college placed the lectures out of the reach of many elementary school teachers.

Hygiene and Heredity at Liverpool University.—The University of Liverpool grants a degree of Master of Hygiene (M.H.) on the recommendation of the Senate after report from the Faculty of Medicine. The period of study for the degree extends over two years and includes a three months' course of lectures and practical work on "Genetics, Heredity and Environment."

A Eugenics Education Society in Chicago.—We are informed that a dining club under this name has been formed in Chicago. The members meet regularly and hope to develop a general interest in the subject and to do useful work.

Cytology and Heredity.—The Croonian lecture was delivered before the Royal Society on June 11th by Professor E. B. Wilson, who took for his subject, "The Bearing of Cytological Research on Heredity." His main contentions were that it is possible to explain the combinations shown in Mendelian inheritance by the shuffling of the chromosomes and the smaller entities that they might contain; that the chromosomes played an important though not an exclusive rôle in heredity; that the facts of sex-linked heredity could be made clear by means of an accessory chromosome, single in the male and double in the female, and that there was good evidence for the view that the linkage shown between the units of different groups of inherited qualities was due to the fact that they were borne by the same chromosomes.

Galton Laboratory Lectures.—The staff of the Galton Laboratory have been turning their attention to provincial centres. Professor Karl Pearson delivered a popular lecture at Liverpool on May 22nd, entitled "Some Aspects of the Problem of the Relative Intensity of Nurture and Nature," and Dr. David Heron has recently concluded a series of lectures on National Eugenics at University College, Dundee. The last lecture of the course appears to have covered much the same ground as that of Professor Pearson at Liverpool, while on previous occasions Dr. Heron's subjects had included the inheritance of mental capacity and mental defect, of good and bad physique, and of tuberculosis.

The Campaign against Venereal Disease in Liverpool.—A General Committee consisting of ladies and gentlemen of prominence in the City of Liverpool has been formed to co-operate with a Special Committee of the Medical Institution in order to combat venereal disease, and on May 27th they inaugurated their active campaign with a meeting at the institution, which was addressed by Dr. Charles J. Macalister on "The Sociological Aspects of the Venereal Diseases." Dr. E. W. Hope, medical officer of health, and president of the institution, was in the chair, and was supported by the Lord Mayor and the Rector of Liverpool.

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- *ALDEN, M., 1912. *Child Life and Labour*. Pp. 192. (L. 651.)
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N.B.—Those marked by an asterisk were presented by Mr. E. J. Thompson.

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- Legislation for the Feeble-Minded*, by MISS A. H. P. KIRBY. (Publishers: The National Association for the Feeble-Minded, Denison House, Vauxhall Bridge Road, S.W. Price 2d.) An excellent pamphlet stating briefly and clearly the scope of the Mental Deficiency Act,

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THE EUGENICS REVIEW

EUGENICS AND THE WAR.

THE relation of war to eugenics has been the subject of much controversy in the past. There have been those who argued that war, and the preparation of a nation for war, were beneficial eugenic influences. The militarists have urged that preparation for war necessitated the setting of a high standard of physical and mental fitness, and that in countries where conscription was in force this had a real selective value, in that those rejected by the State as unfit for military service were often rejected by the woman as unfit for matrimony. They also maintained that the ideal of military efficiency, coupled with universal training with a view to the general attainment of that ideal, was bound to raise the average standard of the race. Extreme exponents of the war creed argued that even war itself was beneficial to nations, in that the weaker race was crushed out, the stronger surviving and taking its place. While appreciating the effect that many great wars have had in the lowering of the standards in both conquered and victorious alike for many generations, others nevertheless viewed the preparation for war as an eugenic agency, for trusting that with the spread of education the danger of actual war would be greatly diminished, they held that the advantages to be derived from the preparation for war outbalanced the increased risk of war due to that preparation. In other words, they believed that the risk of war was worth running because the preparation for war was good for mankind, and they thought that this beneficial training

could not be secured on any other grounds than that of preparing to make war.

The subject as a whole is replete with controversy, and the truth is to be found only by a careful analysis of a large number of eugenic and dysgenic influences, and the striking of a final balance.

On broad lines, it may be conceived that war, in the earlier stages of the development of the race may have beneficial effects which may cease in more highly developed stages of civilization. On these lines Spencer showed that war was one form of the struggle for existence which promoted the survival of the fittest and thus had created a tendency to racial improvement. But what may have tended to racial advancement in the past ages, when small communities depended for their very subsistence upon strength of arm, physical courage and subtlety, has ceased to promote advancement in the more highly civilised condition of to-day. Whatever argument may be adduced in favour of the preparations for war as of eugenic value in our own times, it must be generally conceded that war itself, under modern conditions of mechanics and mobility, is almost entirely dysgenic. It is not necessarily the best that survive in the warfare of the present day. The youngest and the bravest of the race are certainly diminished in numbers. Prowess in battle has no "survival value" in the biological sense, as regards the individual, and little as regards the nation; for even the victorious nation, though surviving and dominating, multiplies from an inferior stock after the war. Two unequal races join in battle, and the one which survives is thus proved the fittest in the struggle. But the survivor may be so damaged as to be thrown back many stages in the course of development, and the world as a whole is the poorer.

The struggle for existence which in the earlier days of the human race implied constant sanguinary conflicts between tribes had its beneficial effect in its own time; but the struggle for existence commensurate with the development of the race to-day is on a higher plane. To quote Dr. Sarolea, "The decisive struggle for life in modern humanity is not the external and superficial struggle of the battlefield, but the permanent

and deeper internal struggle of the city, of the laboratory, of the workshop, of the home, of the soul, the struggle for political rights or legal rights, the struggle for religious freedom, the economic struggle for a living or for a higher standard of living, the struggle for truth." The war philosophy of the Prussian school is a reversion to savagery, a reactionary policy doomed to failure through its utter want of accord with modern conditions.

But at the present moment the discussion of this question on philosophical and academic grounds is possibly as foolish and as futile as Nero's musical efforts while Rome burnt. The horror of a great war—the greatest the world has ever known—is upon us, and the eugenic and dysgenic effects of war are about to be put to the supreme test of actual experience. All we can now do is to put forward every endeavour to mitigate the racial injury to the utmost of our power.

The British Empire, by reason of maintaining her army on a voluntary basis, must inevitably suffer racially more than other nations. The battle death-rate must strike her unevenly and reduce the number of her males amongst the class from which it is most desirable that she should produce the stock of the future. In the countries with universal compulsory service the reduction in effective males will be spread over the entire population; good and bad will alike be reduced. In this country the types which are physically and mentally superior will volunteer for active service. Those of the strongest character, possessing most love of adventure, the greatest initiative, the keenest and the fittest will lay themselves out to be reduced in numbers. The sample of those killed will not be the average of the race, but the best type of the race. The cream of the race will be taken and the skimmed milk will be left. Although the system may give victory and national prestige, the racial effect must be injurious. It may even be disastrous.

Certain definite action may, however, be taken to minimise the evils.

i. By increasing the birth-rate of the depleted class, and by taking every precaution that the greatest possible percentage of births in this class reach maturity.

2. With these objects in view, all who wish to marry before leaving the country should be encouraged to do so, the fullest security being given that every wife shall be well cared for and properly looked after in the husband's absence.

3. The wives and children of those who have gone to the front should be well cared for and encouraged to maintain the advantage already gained in the struggle for existence.

4. Every possible means should be taken to prevent the economic disturbance caused by the war proving disastrous to those who, by reason of age or other cause, have been unable to go on active service.

Efforts upon these lines have already been made to deal with the industrial section of the population. The question of unemployment of the industrial classes, the care of families of soldiers and sailors at the front; these have, to a large extent, been met by various funds. But there is one direction in which little, if anything, has been done to ward off the disastrous effects of the war. The professional and middle classes are in a somewhat peculiar position. In normal times this great section of the population is well able to look after itself. A large number of persons belonging to the professional and educated classes will, in the event of the war being prolonged, be thrown out of employment. The younger unmarried men will, in most cases, obey the call to arms. Many married men of acceptable age will also join the fighting forces. But there will necessarily be a large number of men who for reason of age or infirmity, or for family reasons, will be unable to join the army or co-operate definitely for home defence. It must also be remembered that many professional men are enlisting in the ranks, and this group will require special treatment.

During the next few months many will inevitably have to give up the struggle to keep their business establishments going, and numbers of clerks, typists, and other employees, will be thrown out of work.

In normal times of peace and prosperity a very large number of the population are engaged in connection with businesses and industries built up on the basis of a high state

of civilization. In time of war there is a rapid reversion to a more primitive civilization.

The field for the provision of luxuries and amusements is one of the first to suffer. Later, many of the professions suffer from the cessation of business due to the restriction of credit. Contracts are cancelled, new works are not started, and the kindred professions of architecture, engineering, surveying, accountancy and law must suffer. Many of those engaged in work connected with art, journalism, the stage, amusements, etc., have already felt the pinch of poverty. The distress may extend rapidly through ever-widening circles as we draw near to the winter.

It is now useless to criticise the fact that in this country there has been a vast amount of employment in the non-productive fields of work. The higher the pitch of civilization the larger is the percentage of the population which can, in normal times, be legitimately employed in the non-productive works. Amusements and luxuries are naturally and rightly given up at a time of national crisis. The money spent upon these things is reserved for other objects. Economies have to be effected. Inevitable and right as this curtailment is, the immediate effect is to deprive vast numbers of the source of income upon which they and their families have been subsisting.

A complete reorganisation of employment amongst the educated and professional classes cannot be carried out without immense temporary local hardship.

Industrial distress is in many ways more easily dealt with, and may very possibly not be as severe as many anticipated. The State can do, and is doing, much towards the organisation of relief amongst the industrial classes. With the middle classes the problem is more difficult.

In normal times, it is realised that there is great difficulty in rendering assistance on sound lines to persons of middle class who are reduced in circumstances. In times, such as those we are approaching, the difficulties will be far greater.

Not only will the question arise of dealing with those who have been ruined by the economic conditions brought about by

with individual cases of distress on family lines. Assistance will be given to men to find new openings, as far as possible, in connection with their own professions, and the Council will be in a position to watch events and to approach the government, local authorities, or other bodies in the interests of members of the professional classes. They will urge that, as far as possible, employment shall be evenly distributed, and overtime should be avoided by bringing into employment as many persons as possible. To render the individual more mobile and to free him from anxiety during the period of unemployment the Council may, in certain cases, by co-operation with the societies organising relief, give assistance to the women and children of the family, thus leaving the man free, if necessary, to seek unskilled temporary employment at a distance. The running expenses of the household can be reduced during the winter, hospitality being offered to the wife and younger children, the older children being sent to special schools, for it is hoped that arrangements may be made by which existing schools which might otherwise have to close through lack of pupils may be kept open by special arrangements.

Preparations are being made to carry these plans into effect. The Eugenics Education Society have, under the scheme, undertaken the organising of one important branch of this work, namely, the Maternity Assistance, and members of the Society, and readers of the REVIEW, are invited to co-operate in this work, which may be looked upon as being essentially eugenic.

It is proposed that the first maternity home should be arranged in London, and the Society are negotiating for a suitable hospital for the purpose. Doctor Scharleib, Doctor Florence Willey, Doctor H. Simson, and Doctor H. Barnes, and several others have promised their services on the voluntary staff, thereby assuring the best possible treatment to the patients. A number of fully trained and qualified midwives and maternity nurses have also offered their services, and it is only necessary to provide sufficient funds for the cleaning and refitting of the hospital and to guarantee the wages of the soldiers' and sailors' wives and widows whom it is intended

In addition to the special hospital, a number of maternity nurses have volunteered to give their assistance in private houses. It is also proposed to secure a certain number of country houses which may be fitted up as convalescent homes for those leaving the hospital. Several houses have already been offered, and it is only a question of time to take advantage of these offers, to organise the system of relief and thus to open out one definite line in which material assistance may be given to a class who deserve to receive every consideration from the community.

THE HABITUAL CRIMINAL.¹

By MAJOR LEONARD DARWIN.

SIR Francis Galton was born on February 16th, 1822, and this year on the anniversary of that date we met to celebrate the event, thus establishing what we hope will prove in future to be an invariable custom of our Society. This celebration having met with your unanimous approval, it is quite unnecessary now to repeat all the arguments in its favour. One of the objects hoped to be attained by these annual gatherings may however well be emphasized over and over again on these occasions, and that is to ensure that the meaning which the founder of our science attached to the word "eugenics" shall never be lost sight of. In the case of those who have for long been devoting their best efforts to the study of questions immediately affecting human environment—in other words in the case of nearly all philanthropists—the diversion of their attention to questions connected with heredity seems to require a severe mental wrench, an effort which many of them appear to be wholly incapable of making. In short, many persons of the highest character have not yet learned to think eugenically. As to those whose thoughts are exclusively devoted to the betterment of their own personal surroundings, a change in their mental attitude is almost past praying for. But earnest social reformers, who have not studied Eugenics seriously, should have their attention drawn as frequently as possible to the many extracts from Galton's writings which indicate his ideals, not in the least with the desire of making them abandon their present aims, but in the hope that they may thus be led to spare a portion of their sympathies for our endeavours. Only one such quotation will here be given. Eugenics, or the science of improving stock, is we are told, "by no means confined to questions of judicious mating, but . . . takes cognisance of all influences that tend, in however remote a

¹ Presidential address delivered at the annual general meeting of the Eugenics

degree, to give to the more suitable races or strains of blood a better chance of prevailing speedily over the less suitable than they otherwise would have had "¹—the word "prevailing" no doubt here being used in a racial and not in an immediately destructive sense.

The aim of the philanthropist or of the social reformer is to improve the environment of the people, and all men, whether eugenists or not, are bound to sympathise with them as regards the objects thus sought to be attained. We must as citizens aid in the cure of the sick and in the alleviation of the destitute, even though as eugenists we see that the multiplication of the less desirable types of humanity is thus encouraged. But, though social reform is often accompanied by harmful eugenic consequences, yet on the other hand unintended eugenic advantages also often arise. In these circumstances it must obviously be our policy to try not only to mitigate or apply an antidote for the eugenic harm now resulting from philanthropic efforts and legislation, but also to increase their beneficial eugenic consequences if there be any. No doubt environmental reforms, with their agreeable immediate results, will always be far more attractive than eugenic reforms, which are intended only to benefit posterity; and for this reason we must be on our guard against the pressure so often felt tending to push eugenic proposals into the background. But, remembering this danger, we should not only express our human sympathies with the aims of social reformers, but as eugenists should openly join hands with them in so far as we can thus hope to secure eugenic benefits.

There is one broad consideration which may well lead us to hope that some eugenic advantages will not infrequently spring from reforms merely intended to affect human surroundings. The philanthropist is constantly aiming at the cure or the reform of the individual, and his efforts must result in those more easily cured or reformed being separated out from those less amenable to environmental influences. In the opinion of eugenists however, this is in fact in large measure a sorting out of those more strongly endowed with innate harmful pro-

¹ Inquiries into Human Faculty, Everyman's Library, p. 17 note.

clivities from those having a better natural inheritance. For example, patients who are completely cured by sanatorium treatment have on an average a weaker tubercular diathesis than those who linger on for long afterwards as consumptive invalids. Again the farm colony system of dealing with tramps, which has been established in certain foreign countries, tends to separate out those whose poverty is mainly due to bad surroundings or to ill luck from those who differ from the industrious working man mainly in having been born with some definite mental or bodily defects. In reply it may be urged that all these social failures are due to bad environment having burnt its way so deeply into the character as to leave an incurable wound. But social reformers have long been at work trying to remove all the harmful elements in human surroundings, and the greater the success of their efforts, the more even will be the terms on which the race of life will be run; or, in other words, as social reform proceeds, the differences in heritable natural qualities will have relatively more influence and the differences of environment relatively less influence on the social fate of the individual. If, in time, all men were shown to be equally amenable to environmental influences, none being found to be incurable or irreformable, then it is true the eugenist would be proved to be wrong in holding that the innate tendencies of a race are the basis on which the whole structure of its civilization ultimately rests. The popular belief in the innate equality of men will, however, gradually disappear in the face of irrefutable facts, and it will before long be generally recognised that there does exist a large class of human beings whose fertility should be as much as possible diminished for the sake of posterity, this being the main task of the eugenic reformer. We see then that, as social reform proceeds and as the unfit are thus more and more clearly marked out from the nation at large, the numbers to be considered with reference to eugenic reform will be proportionately diminished, and this method of securing racial progress will thus be greatly facilitated. Though we ought never to forget the harm which is now being done by the encouragement to breed and multiply given in many ways to the less desirable types of humanity, yet

on the other hand we must do our utmost to utilize and foster all that is good in the inevitable features of advancing civilization, including this unintended sorting out of the innately defective.

Several examples might be given of social reforms producing eugenic by-products which might be more effectively utilized than at present, but of these only one will now be mentioned, namely, the recent and proposed changes in the treatment of habitual criminals, especially those who have committed many minor offences. In their case the eugenist first has to show that it is necessary to enquire into the need for lessening their rate of reproduction on account of their heritable innate qualities. In Dr. Goring's recently issued work on "The English Convict," strong reasons are given, supported by careful statistical investigations, for believing that criminals are not a class apart, but merely ordinary individuals with certain common innate qualities exceptionally well marked, a conclusion with which I am fully in accord. It is not any single heritable quality, but several different qualities which together have had the effect of making this section of the community respond in an undesirable manner to the stimulus of the surroundings into which they are thrown. Even though a general improvement in the environment of the nation and of the prisoner would cause a diminution in crime, yet few will deny that whatever advances were made in these directions, a more or less numerous remnant would still remain who would be addicted to crime. And if the criminals who would thus be proved to be unamenable to reform could be sorted out from the rest, the fact that they are not abnormal monsters, as some criminologists have asserted, affords no justification whatever for neglecting to consider the possible effects on posterity of permitting them to breed freely. Their strong natural tendencies, like great height or any other well marked inborn human characteristic, are, we hold, subject to all the laws of natural inheritance, and will infallibly tend to reappear in their descendants. If this be so, to lessen their fertility must be regarded as well within the scope of eugenic reform.¹

¹ See *Crime and Criminals.* R. F. Quinton, p. 119.

The heritability of the innate tendencies which lead to crime will probably be denied in many quarters, even though it be admitted that crime itself has a marked tendency to run in families, a conclusion greatly reinforced by Dr. Goring's work. This admission, however, by no means establishes the case of the eugenist; for tradition and circumstances of various kinds often lead to several members of a family adopting the same profession, and similarity of environment may, in like manner, account for more than one of a family taking to crime as a livelihood. The eugenist has, indeed, to base his case largely on analogy when urging the prime necessity of taking the differences of innate qualities also into account when searching for the ultimate causes of crime, and unfortunately such broad considerations weigh but little with the general public. We shall therefore be wise in regarding this question of natural heritability as at present a weak part of our armour when attacking problems connected with criminality, and we should therefore urge the necessity of further research on this subject however confident we may be that the result would merely serve to strengthen our position.

Though it lies somewhat outside the scope of my subject to consider the methods which should be adopted in such investigations, yet a word or two on this point may, perhaps, be permitted. The collection of pedigrees of criminal and non-criminal families with proper care is of great value; but in drawing conclusions from them we are always brought face to face with the difficulty of eliminating the element of environment. A better method of solving this problem would be to follow the career of children who had been removed early from their criminal parents and home surroundings, and to compare them with the careers of other children in otherwise similar circumstances. But in carrying out this difficult investigation, it would be necessary to bear in mind a characteristic which may be and I believe is common amongst criminals, namely, their great amenability to the influences of their surroundings. The same person who is easily influenced for evil in a bad home may also be easily, though, perhaps, only temporarily, influenced for good in a well-managed institution. In carry-

ing out such an investigation, a record must certainly therefore be kept until some little time after the period of manhood has been reached, and, indeed, the enquiry, to be thoroughly conclusive, ought to extend into a third generation.

Even in the present state of our knowledge, the eugenist has, however, little doubt as to the causes which ordinarily lead to a life of crime. Individuals endowed with those natural qualities, mental or physical, which render resistance to crime more than ordinarily difficult, must often be brought into bad surroundings, mental or physical; the bad environment reacts on them, dragging them down in body and mind, and this action and reaction continuing either in the individual or generation after generation, results finally in a long series of short imprisonments. The aim of the social reformer is, when possible, to break the vicious circle by at once removing the link of bad environment; whilst the eugenist would at the same time also strive to strengthen the innate characters of the individuals composing the coming generations. This latter result might, we believe, be obtained by selective breeding, for some relative increase in the powers of resistance in our nation in the future could be obtained even if only a proportion, small or great, of the criminal members of bad families were prevented from becoming parents. Putting aside the "uncultured," amongst whom "the criminal has always been the hero,"¹ no one would assert that crime picks out the best members of a family, though it might be seriously urged that the criminal often shows a superior power of initiative to that displayed by his law-abiding brother. But in a bad family may it not even more often be the boy who grows up to be a good citizen who shows the greatest independence of character? Again, courage has been claimed as a marked characteristic of the criminal, and this is no doubt true as regards those convicted of certain crimes always severely punished when detected. But, as regards the man of many petty crimes, the only courage he as a rule need show is that required to face disgrace and imprisonment. Is this a racial quality worth preserving at great cost and suffering to the nation? Those who

¹ *The Criminal.* Havelock Harris. p. 349.

study the "vacuous minded, erratic and animal person who is usually" the habitual criminal will find few qualities in him to admire.¹

If it be granted that there does exist a class of criminals whose seed should not be permitted to contaminate posterity, our first step obviously should be to sort them out for special treatment. This country contains a large habitual criminal population, so large, according to Dr. Goring, that those convicted six times and more number over one hundred thousand individuals; and, even if this careful estimate should prove to be in excess of the truth, we yet may conclude from it that the eugenist can only hope now to deal with the worst cases, a limitation of endeavour which would be wise on the mere grounds of expediency. Our object should be therefore to pick out those who are endowed to a very exceptional extent with natural qualities which facilitate the adoption of a life of crime; and, in this demarcation, the number of crimes committed is the most important criterion to be held in view. Though the effects of the differences in home surroundings would not thus be eliminated, yet we may feel sure that the man of many crimes nearly always has in a high degree all those innate qualities which tempt him to wander from the path of honesty; whilst this method of differentiating him from the rest of the criminal population, being both easily understood and based on judicial decisions, would be that most readily accepted by the public. Then again, the stronger these damaging tendencies the earlier in life will the criminal, on an average, begin his life of crime, because the sooner will all influences for good be overcome. A well-marked characteristic of the criminal class generally (excluding those convicted of fraud of various kinds), according to Dr. Goring and others, is their mental defectiveness or stupidity; and this, therefore, is a heritable quality leading to crime which ought to be taken into consideration, especially as it has no counterbalancing advantages. Bodily defects of a heritable character are also found to be correlated with crime; for habitual criminals are certainly below the average of the community in physical strength, if those committed for crimes

Ibid. p. 328.

of violence are omitted from the list. Weakness of body, no doubt, militates against the chances of honest employment; and, although this fact should arouse our pity for those thus afflicted, yet we must remember that these defects, if transmitted by heredity, would in like manner make their descendants especially liable to fail when tempted. All that is now being done in the direction of the psychological and physical examination of both prisoners and school children should therefore be encouraged and extended; for the records of such investigations, if properly conducted, would be of great value in estimating the fitness of the criminal to meet the ordinary strains of life. The eugenist may, in fact, safely conclude that if attention be paid to the number of crimes committed, to the age at which the life of crime was adopted and to all defects of mind or body, a well-instructed official supplied with full reports would have no difficulty in selecting a large number of individuals whose descendants, if they had any, would certainly be an element of national degeneracy in future. It should be noted, moreover, in this connection, that by these same tests we should be selecting those individuals who are most likely to drift back into a life of crime if given their liberty.

Having selected a class of the criminal community whose progeny the nation of the future could well do without, the next question is how the said progeny is to be prevented from appearing on the face of the earth. Whatever possibilities the future may bring with it, it must be admitted that the only method now within the region of practical politics in England for securing this result is the segregation of these criminals during the period of their fertility. If such detention were adopted only for limited periods—that is if the progeny of the selected class were merely reduced in numbers and not entirely obliterated—it is a common mistake to assume that little good would thus be done. Though the more complete the prohibition the more rapidly would this method of artificial selection, it is true, produce its maximum effect, yet merely temporary segregation would in certain conditions slowly produce the same ultimate results. According to Dr. Goring the decrease in the fertility of convicts, which is largely due to their lengthy imprisonment,

is such that in that class "crime ought to be decreasing"; or, in other words, penal servitude is now as a fact having a decidedly beneficial eugenic effect, granted that the qualities leading to crime are heritable.¹ May we not, therefore, conclude that a similar diminution in the number of the progeny of the short sentence habitual criminal would result from his prolonged detention, even if he were not given a life sentence?

With regard to the criminals who are "mentally deficient" within the meaning of the recent Act, their segregation is not now likely to be openly resisted, the battle on this point having been won in Parliament last year, largely, no doubt, by establishing the belief that segregation is the kindest course to adopt even as regards these unfortunates themselves. But, as to the man of many crimes, who is merely weak, stupid, or otherwise worthless, to convince the public of the advisability of prolonged segregation in his case on eugenic grounds is a very different matter from convincing the student of heredity; and it must be admitted that our proofs of the heritability of the criminal diathesis, as Dr. Goring calls it, are not now sufficiently convincing to enable us to found on them a bold eugenic policy. But if our existing criminal system is producing some beneficial eugenic effects, may it not be that certain reforms in the methods of punishment, though now advocated without any reference to their effects on posterity, might in an unintended manner produce increased eugenic benefits? A study of this subject has convinced me, at all events, that increased periods of detention of habitual criminals would produce both immediate social advantages and ultimate improvements in the racial qualities of future generations; and, if this be the case, the social reformer and the eugenist ought to be able to march together on this path of criminal reform.

To mark out a common path which all might follow, we must, of course, show that the goals sought to be attained by these two schools of reformers can both be reached by this same road. The eugenist condemns our existing system, whereby the habitual criminal is subjected to numerous short imprisonments, because not only does it not tend to lessen the number

¹ *The English Convict*, p. 336.

of his progeny, but is, indeed, likely to increase his racial productivity by, from time to time, giving him renewed vigour. Many social reformers condemn this same system no less vigorously, but on the ground that as a method of reforming the criminal himself it has been proved to be an utter failure. Statistics indicate that the greater number of punishments received on an average by any class of criminals the more likely they are on an average again to be convicted; and, with this fact before them, the social reformer can hardly urge that the criminal has benefited by his prison environment. All parties can, therefore, start on the common ground that the existing system of short sentences fails in many respects and leaves much to be desired.

The fact that imprisonment seems to be followed by an increased tendency to crime is, however, not attributable in large measure to the evil effects of that imprisonment. Our belief is that the stronger are all those innate tendencies which lead to a life of crime, the more often will crime be committed in a like environment; and, as evidence can be adduced to show that crime is not closely correlated with environment, it follows that, by picking out the men who have been most often convicted, we are unconsciously picking out a group with these harmful tendencies exceptionally strongly marked, that is a group exceptionally likely to lapse back again into crime. And, as our object is to prevent these innate qualities from reappearing in future generations, we believe that amongst criminals it is especially desirable to prevent those who have committed many crimes from becoming parents. We conclude, therefore, that the habitual criminal should be segregated for long periods, a conclusion with which the social reformer may agree, though on wholly distinct grounds. In the first place, as already remarked and as experience amply proves, a very high proportion of criminals of this type, if given their freedom, will commit fresh crimes and will be a serious nuisance to society, a nuisance from which the poor suffer even more than the rich. Then again, is not the habitual criminal if at liberty always a source of moral contagion to others? Many social reformers advocate the immense importance of environment, to an exaggerated

extent as we hold, and they ought to be the first to condemn the practice of letting loose thousands of utterly unreformed criminals into our slums, where their influence may be likened to that of animals carrying with them the germs of some foul disease. Ought we not therefore to try to overcome our natural repugnance to lengthy sentences in order both to save the now uncontaminated from contamination and to lessen the innate temptation to crime in the coming generations?

In reading the works of criminologists it is remarkable how very seldom the fate of the children of criminals is ever alluded to. Surely this is a serious omission if it be true, as certain figures given by Dr. Goring seem to indicate, that the child of a criminal is at least ten times more likely to enter prison than is the child of honest parents, and surely we now know sufficient to justify us in demanding some material changes in our methods of dealing with the criminal population because of the tendency of crime to run in families, whatever may be the explanation of this fact. The reformer who neglects heredity and looks only to environment may believe that several criminals being found in one family is merely an indication of the badness of that home. But, even if the question be regarded in this one-sided fashion, is it right that more children should be allowed to make their appearance in a home which according to this view has already produced such disastrous consequences? Again, as to the children who have already been born into these criminal surroundings, anyone who believes that their home life will make them anything like ten times more likely to go to prison than they would be if removed into a purer, moral and physical atmosphere, must surely advocate their removal from these tainted homes. But would not the inevitable result of such a proceeding be to throw practically the whole cost of their maintenance and training on the State, or, in other words, on the shoulders of the honest neighbours of the parents of these criminal families? Would not the removal of this economic strain from these bad households stimulate therein the production of more children, children who, in their turn, would have also to be transferred to State-supported institutions? And, in all cases where the breaking up of the

family seems to be a moral necessity, must we not ask whether it would be right that all this heavy burden should be thrown on the community at large merely in order to enable criminals freely to indulge their sexual appetites? A study of criminal family statistics must, in certain cases, make the most fervent believer in environmental effects demand the segregation of the criminal parent, both to safeguard the lives of those children who have been born into such foul surroundings and to lessen the numbers of those children who would otherwise be born to face the perils thus arising. And, as to the eugenist, though he may be mainly studying those innate defects which criminals are certain to pass on to some extent to their descendants for an indefinite number of generations, yet he certainly should be eager to join hands with the social reformers in endeavouring to prolong the detention of habitual criminals with these most desirable ends in view. In short, this seems to be the right policy to adopt from whatever direction we approach this subject.

All that now remains to be considered is the legislative or administrative reforms necessary to obtain the results desired, and our first enquiry in this connection naturally is whether it would be possible to secure all the eugenic advantages now within our reach by a thorough administration of the Mental Deficiency Act. Much will have to be done before the machinery established under this Act will produce the best possible results, and unquestionably this is the field to which the eugenist could now most usefully turn his attention. Though this latter point cannot be insisted on too strongly, yet there are good reasons why we should not rest our hopes of securing the segregation of habitual criminals even in the immediate future entirely on this one method. It is true that any person who can be proved to have been mentally defective *from an early age*, and who is found guilty of any criminal offence, may be dealt with under this Act, if either a feeble-minded person or a moral imbecile. But in order to take crime, actual or anticipated, into consideration in the case of a "feeble-minded" criminal, it would be necessary to prove, as it seems to me, that the public needed protection *because of* his feeble-mindedness and not merely because of his criminality;

and, since the commission of crime could hardly be regarded as evidence of mental defectiveness, the conclusion that any further crime would be the actual result of that mental defectiveness would often be difficult to establish, even when some mental defects undoubtedly existed. In dealing with a criminal as a "moral imbecile" it would, on the other hand, be necessary to prove that he had displayed *from an early age* strong, vicious, or criminal propensities on which punishment had had but little effect, also a difficult fact to establish in later years. The commission of any number of additional crimes would, moreover, be no additional indication of vicious tendencies having existed *at an early age*, and in many cases would not therefore render a person more liable to be treated as a moral imbecile. Hence it seems that there are many loopholes in this Act through which undesirable specimens of humanity may be able to escape and then to reproduce their kind.

We cannot, in fact, form any trustworthy estimate of the number of criminals who will be dealt with under the provisions of the Mental Deficiency Act. It has been said that from one-fifth to one-tenth of the persons now in jail are found to be feeble-minded; and, if this statement affords a correct indication of the possible scope of the Act, we shall sooner or later be driven to enquire whether some steps ought not to be taken with regard to the remaining four-fifths or nine-tenths of our habitual criminal populations. If he can only be proved to be either very stupid, very weak or utterly worthless, is the man who commits crime after crime to be allowed to go on breeding freely? It may be fully admitted that there is only one really satisfactory test to apply to this class of the community in order to see if they are capable of playing their part as ordinary citizens, and that is the test of liberty. Under our existing system of punishments there are, however, many who fail over and over again when thus tested, and in cases where it appears that freedom will inevitably lead to a life of crime, does not that system stand condemned? Few who have studied these questions with care have any doubt that habitual criminals ought to be detained for longer periods than at present, whilst every effort should be made to make that detention more cura-

tive in its effects. Moreover, with each successive crime, these periods should be made longer and longer, until, when all hope of reclamation has ceased, permanent segregation must be enforced.

The foregoing considerations have led many criminologists to advocate the system of "indeterminate sentences" in the case of habitual criminals, that is to say a system whereby the offender after having been set at liberty "on license" can at any time be again placed in detention without further judicial proceedings. Though many strong arguments can be brought forward in favour of this system, it is doubtful whether it is worth while now considering it as regards this country, because of the strong opposition which would be aroused against any such proposed exercise of bureaucratic authority. A reform much more easily obtainable, and one which the eugenist ought to endeavour to promote, would be the amendment of the Prevention of Crimes Act in such a manner as to make it more readily applicable to the man of many minor offences. This Act can now only be applied to persons who have been sentenced to three years penal servitude, a sentence which has to be carried into effect before the prisoner can be transferred to an institution for "preventive detention." It is true that penal servitude can be awarded on the ground that the offender is an habitual criminal, three previous convictions being on record. But members of the class we most wish to deal with are not often thus sentenced, because a court is naturally unwilling to give a heavy punishment unless in connection with a serious crime. By cancelling this provision, and in other ways, this Act could, however, be amended without difficulty so as to make it easier to increase the periods of detention of those thousands of unfortunate persons who possess defects of character which drive them whenever free to a life of crime and make them an intolerable nuisance to society—defects which, we believe, will inevitably reappear to some extent in their descendants if they have any. Such a reform would produce no great eugenic results; but, remembering the nature of the evolutionary process which has produced such marvellous results in the past, we might be satisfied with attempting to take this one short step at present.

Success in such an endeavour would, however, merely mean that we had reached a halting place from which a further advance could soon be made.

Time does not permit the discussion of other reforms which would in like manner give in no very remote degree an increased racial influence over posterity to the existing higher types of humanity. It should be the task of the eugenist to search them out, and to promote them when they would be on the whole beneficial. But for the immediate future it may well be that our main efforts should be devoted to that other aim mentioned by Francis Galton, namely, the judicious mating of mankind. If we could get the paramount racial duty which we owe to posterity incorporated as an essential part of the moral code of the nation, then we should be on the high road to success. Such a raising of our ethical standard would not only produce direct racial results of great value, but in its train would follow greatly increased efforts to solve the unsolved problems of our science, together with the supply of the funds necessary for these enquiries, and also an insistence on those eugenic reforms which this increasing knowledge would from time to time fully warrant.

THE HEREDITY OF ABILITIES.

By C. SPEARMAN,

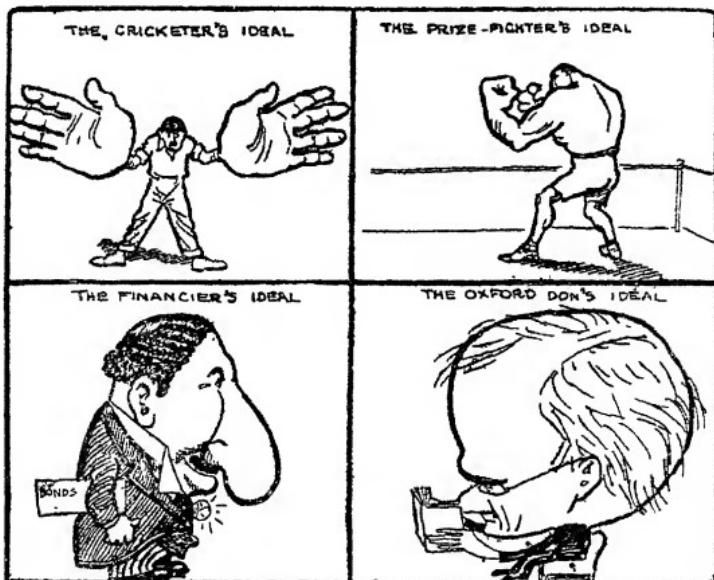
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1.—THE PROBLEM. DIVERSITY OF VIEW.

"YOUR eugenists hope in time to produce an ideal race of men by scientific methods. But will they ever agree on the ideal to be produced?"

Such is one of the objections most frequently levelled at the eugenist movement. For instance, it has been illustrated and enforced in the daily press by the following lively sketches:—

EUGENIC IDEALS FROM DIFFERENT POINTS OF VIEW.



(Reproduced by kind permission of the "Daily Mirror.")

The view underlying these sketches is, if true, damaging enough. It regards each kind of ability as conflicting with

every other kind. The progeny raised for the purposes of playing cricket would be likely to show incapacity in the matter of prize-fighting. The zygote possessing exactly the system of "gens" needed to secure academic laurels would be a disappointment on the stock exchange, and *vice versa*.

This "theory of compensation," as it has been called, is amongst the most ancient and widely accepted. It pervades literature in such mottoes as: "Ne'er a rose without a thorn." Biologists give it more definite expression in the doctrine that: "A normal or diseased organ never reaches an extraordinary size without another organ—of the same or a similar system—correspondingly suffering."¹ Or again, "When an organ from any cause has been developed excessively, then the neighbouring organs suffer thereby, they remain diminutive";² "when a useful change occurs at one point of the living being, at some place a change takes place in the contrary direction."³ So too in popular psychology we find a series of beliefs such as: "that superior ability to get impressions through one sense is related to inferiority in getting impressions through other senses; that intensity of attention varies amongst individuals in opposition to breadth of attention; that the quick learner is the poor rememberer; that the man of great artistic gifts, as in music, painting, or literary creativeness, is weak in scientific ability or matter-of-fact wisdom, etc."⁴

A second view as to the relation between abilities—one whose defenders have been less numerous, but equally distinguished—is that of general independence; that is to say, it held that every ability develops without appreciable interference from the others. Among the biologists inclining in this direction is Wallace, who writes that every part or organ may exhibit large variations independently of the other parts.⁵

A similar position seems to have been defended by an important American school of psychology.⁶ Even on this sup-

¹ Pr. de Saint Hilaire, *Balancement Organiquement*, 1807.

² de Caudolle, *Introduction to Botany*, 1835.

³ de Caudolle, *Introduction to Botany*, 1862.

⁴ Thorndike, *Educational Psychology*, 1910, p. 183.

⁵ Darwinism, 1889, p. 81 ff.

⁶ See Aiken, Thorndike and Hubbell, *Psych. Rev.*, IX., 1902.

position, the eugenists would be seriously hindered. Their efforts to better the race could be of slight avail, if they had to be dissipated in hunting after innumerable independent abilities.

The third chief view—one that appears to have had, and still to have, the greatest following in psychology—is that all the varied manifestations of mental ability may eventually be traced back to a small number of basal powers, such as observation, reasoning, memory, judgment, discrimination, imagination, etc. These powers are regarded as constituting functional unities. A person gifted with close observation or sound judgment is considered able to apply such power in any direction he may choose, whether to business organization or to botanical research, to the field of battle or to the medical consulting room. But between one of these powers and another, the unity of function is no longer upheld; keen observation is not regarded as guaranteeing excellence of memory, nor is a ready memory taken to indicate profound power of judgment. This doctrine, it is clear, has much in common with the old one of "faculties"; it differs therefrom in having dropped all the latter's metaphysical implications; but it still retains similar functional unities. Here, the task of eugenics would at any rate be reduced to reasonable dimensions; instead of innumerable independent abilities, there would only be some half a dozen basal powers to cultivate.

But far more hopeful still is the fourth view, voiced by Carlyle: "For at bottom the great man, as he comes from the hand of nature, is ever the same kind of thing: Odin, Luther, Johnson, Burns; I hope to make it appear that these are all originally of one stuff; that only by the world's reception of them, and the shapes they assume, are they so immeasurably diverse."¹ Similarly, if in more prosaic fashion, among many psychologists "the assumption seems to have been that intelligence is some central ability which comes into function in every mental operation, and that if a person has a certain degree of intelligence in one direction, and if allowance is made for practice, experience, and acquired interest, he will be found to have about the same degree of intelligence in other

¹ Heroes, Hero-worship, and the Heroic in History, Lect. II.

directions."¹ Indeed, it is in this view, it would seem, that the logical basis must be found for many of our social institutions. It is hard to see else, for example, why we should examine our young men in Latin and Greek in order to select the fittest for ruling the inhabitants of India.

How shall we decide between these four, and possibly other, claimants upon our belief and action? Each of them quotes weighty authorities on its side; each is the product of a wide range of actual experience; each is affirmed with the same confidence—not to say, intolerance of contradiction. Ordinary experience and knowledge of human nature have, then, foundered into a quagmire, from which they appear impotent to extricate themselves.

2.—MODERN METHODS OF INVESTIGATION.

Fortunately, there has in recent years sprung up a psychology of more exact character. For the purpose of estimating abilities, we are no longer at the mercy of hearsay, casual experience, and remote reminiscence; instead, the abilities can be definitely measured and permanently recorded. Further, there is no longer any need to trust in general impressions on the all-important point, as to whether two series of measurements are dependent on one another. Through the genius of Galton, we can now estimate the degree of correspondence between the two series by means of the "correlational coefficient."

This is so constructed that, when the two series are strictly proportional to one another, it takes its maximum value of +1. Such should be its amount between the measurements of the same set of persons in two different kinds of ability, then, if Carlyle is right in holding different abilities to be essentially the same.

As the correspondence between the two series becomes less and less close, the coefficient continually diminishes; and on their being wholly independent of one another, it goes down to 0. This, then, is the result needed between different kinds of ability, in order to agree with the independence theory.

¹ Colin Scott, Jour. Ed. Psych., IV., 1913, p. 500.

When the measurements in the one series even tend in the reverse direction to that of the other series, the coefficient takes a minus value, with an extreme limit of -1 . Some such minus value can alone satisfy the theory of compensation.

Finally, for agreement with the view of basal powers or "faculties," the coefficient should vary according as any two abilities compared with one another belong to the same or to different powers. In the former case, it should approach to $+1$; in the latter to 0 .

These newer methods have been freely put into practice. A great variety of test performances, including many kinds of observation, memory, reasoning, etc., have been devised and applied to thousands of men, women, and children, in every civilized country. The surprising result has been, however, not a verification of one theory out of the four competitors, but a refutation of them all. Nothing could be more emphatic than the rejection of the theory of compensation championed by the newspapers; the correlation between different abilities has turned out to be never inverse, but always direct; the fear of one mental endowment being at the expense of another has been allayed. The theory of independence is also put out of court, since the correlation has rarely been zero. But on the other hand, it has not risen to $+1$; nor does it seem capable of doing so with any equalization of experience and interest, as needed to agree with Carlyle. Still less has it alternated between plus one and zero, as demanded by the theory of faculties.

3.—THE LAW OF PROPORTIONALITY.

This unsatisfactory result is a useful warning against the earlier extreme notions about the use of correlational coefficients. Some of their advocates seem to have naively hoped that the bare calculation of the coefficient would furnish the last word of science. Everywhere this expectation has been disappointed. Scientific investigation has proved itself to require, over and above mathematics, a profound knowledge of the concrete facts, together with an active experimental groping after new points of view. But still less support has been given to the opposite extreme view,

which desired to continue placidly in the old rut of investigation, regardless of the new potent calculus offered to them. The complexity of science, far from dispensing with mathematics, only makes the higher claims on their services; if rejected in their original crude forms, they sooner or later return to the field in greater elaboration than before. In the present case, we shall find that the problem which was so insoluble by single correlational coefficients yields easily enough to the consideration of systems of correlations.

This may be illustrated by an instructive research due to Bonser.¹ He applied five intellectual tests to 757 schoolchildren, and calculated the correlational coefficients by the usual method (that of "product moments"). The results are given in the following table.

TABLE I.
Bonser's Correlations.

	Selective judgment.	Mathematical judgment.	Spelling.	Controlled association.	Literary interpretation.
Selective judgment		'397	'195	'397	'335
Mathematical judgment	'397		'295	'485	'400
Spelling	'195	'295		'247	'275
Controlled association	'397	'485	'247		'397
Literary interpretation	'335	'400	'275	'397	

At first glance, the figures look as unpromising as before; not one of them suits any of the four theories mentioned above. But let us turn from the single values to the table as a whole, and consider, not the absolute, but the relative magnitudes. Take any two columns, for example, the first and second, omitting the values that have no correspondent in the other column. This gives Table II.

TABLE II.
The first two columns from Table I.:—

1	2
'195	'295
'397	'485
'335	'400

¹ See Brit. J. Psych., V., 1912, p. 62.

It is at once seen that the values in column one are very nearly proportional to those in column two. But the tendency of two series of values to be proportional to one another is just what is measured by correlational coefficients. Let us, then, measure the correlation between column one and column two. This correlation between columns of correlations, calculated in the usual way, turns out to be no less than plus 1.00; that is to say, it is perfect to the first two decimal places.

The procedure which we have just applied to columns one and two is, of course, equally applicable to any other pair of columns. In all, there are ten different pairs. Out of these, the correlation between correlations comes no less than four times to the complete plus unity. Once, it comes to +.99; once, to +.98; while even the remaining four pairs give high positive values.

Such a constant and close adherence to proportionality is beyond all suspicion of arising from mere chance. It becomes necessary, then, to inquire under what conditions it occurs. This is a question requiring careful reply. Though the phenomenon is palpable enough in the above instance when pointed out, it may otherwise easily escape detection; Bonser himself seems to have quite overlooked it. But in other similar investigations, even keen scrutiny will rarely find cases so evident as to be beyond the range of dispute.

It must, however, be remembered that in psychology, as in physics and other sciences, the raw experimental data are subject to various disturbances, for which due correction must be made. A mechanical machine always appears at first sight to give out less energy than is put into it, a fact which, if verified, would contradict the law of conservation. But narrower inspection invariably shows that there has been an escape in other forms, such as heat. On making the necessary corrections, the energy put into the machine and that taken out of it always prove to be equal. Analogous corrections are naturally required in the case of our tables of correlations also; generally, they will be of a very simple character, consisting merely in an allowance for the "errors of sampling" (*i.e.*, the

errors whose general magnitude is indicated by the "probable error" of the coefficient).

TABLE III.

Correlation between correlations for all hitherto published researches.

Year.	Investigator.	Subjects.	Mean Correlation between Correlations.
1889	Oehrn	10 students	+ .93
1902	Thorndike	160 boys and girls	+ 1.04
1904	Spearman	37 boys and girls	+ 1.16
1904	Spearman	24 boys and girls	+ 1.01
1906	Krueger and Spearman	11 students	+ .96
1908	Peterson	96 students	+ .94
1909	Foerster and Gregor	11 insane patients	+ 1.12
1909	Burt	30 boys	+ 1.06
1909	Burt	13 boys	+ 1.06
1910	Brown	56 boys	+ .86
1910	Brown	39 girls	+ 1.02
1910	Brown	40 boys	.97
1910	Brown	23 students	.93
1910	Brown	56 women	.89
1910	Bonser	385 boys	.97
1910	Bonser	372 girls	.96
1912*	Simpson	37 adults	.96
1913*	Wyatt	75 children	.97
1914*	Abelson	78 children	+ 1.02
1914*	Webb	200 students	+ 1.02
Average			+ .99 <u>±</u> .01

The above data up to Bonser inclusive are given with detailed references and a discussion of the whole problem in a paper on "General Ability" by Hart and Spearman, Brit. J. Psych., V., 1912, p. 51. The data for Simpson are given in "The theory of two factors" by Spearman, Psych. Rev., March, 1914. Those of Wyatt appeared in his paper in the Brit. J. Psych., VI., 1913, p. 109. The researches of Abelson and Webb are just about to be published. It should be noted that the method of "correction," as usual, is devised so as to furnish a value which will be right *on an average*. Consequently, when, as here, the true value approximates to complete unity, about half of the individual "corrected" values ought to be greater than unity; although, of course, no true value of a correlational coefficient could be greater.

On making such corrections, the remarkable and apparently exceptional proportionality found in the above table of Bonser proves to hold good *universally and exactly*. Facing is a table summarizing the work of all the investigators of the subject, most of whom approached the problem with a strong bias against the proportionality and its theoretical consequences; even in publishing their results, they declared the proportionality to be absent.¹ But at that time, the methods of calculation were comparatively crude. On applying the present more exact methods, the following list of results ensues. The average value of the correlation between correlations comes to + .99 + .01; and in not one single case is the departure from + 1 greater than could reasonably be attributed to mere chance variation of samples. It is not too much to say that such an agreement between all investigators at all times and under all conditions is unparalleled in psychology and scarcely to be matched in the most exact of the sciences.

4.—THE THEORY OF TWO FACTORS.

We have thus succeeded in piercing the outward shell of seeming irregularity in the experimental results, and have penetrated to an underlying universal orderliness. The next step is to ascertain what light is thereby thrown on our present problem, the connection between different abilities.

It may easily be shown that we are as far as ever from being able to accept any of the four previously mentioned rival solutions. Just as these could not be reconciled with the absolute values of the correlations between abilities, so too they are incompatible with the proportionality between these correlations.²

It has turned out, however, that, though every one of the four views taken singly is impotent to explain the facts, a perfect solution is afforded by two of them taken in combination. These are the second and fourth, the former holding that all the abilities are independent of one another, and the latter that they are all connected by common dependence on the same thing. That is to say, the sole hypothesis compatible with the

¹ Those who, on the contrary, have supported the proportionality are Krueger, Burt, Wyatt, Abelson and Webb

² For proof see "General Ability," Brit. J. Psych., V, 1912

facts is that every ability depends on *two* factors; the one of these is a specific ability or disposition, different and independent for every different kind of ability; the other is the general energy of the mind, always the same. The mathematical proof of this fundamental proposition of psychology is so simple that it can be given below in a footnote.¹

This analysis of every mental ability into two factors will be found by many to be more clearly conceivable when expressed in terms of physiology. The function of the central nervous system has for centuries been the subject of heated controversy. On the one hand, Flourens and his followers have declared that the whole cerebrum acts as one single organ subserving any kind of mental operation. On the other hand, a long array of investigators have maintained the directly opposite doctrine, that every part and parcel of the cerebrum has its special work to perform. The above discovery of the two factors supplies the simple reconciliation between the two warring parties; as so often occurs, both were right in what they affirmed, but wrong in what they denied. Every mental process is, indeed, served specially by some particular part or process of the cerebrum; this constitutes our specific factor, different and independent for every different ability. But at the same time, every mental process utilises also the energy of the whole cerebrum, especially the cortex; this is the general factor, always the same whatever the mental process.

The double truth had already been suspected by some of our leading physiologists and neurologists. Mott, for instance,

¹ Let *a*, *b*, *p*, and *q* denote any four abilities, each assumed to depend partly on a specific independent factor, and partly on a general factor; call the latter *G*. Let the correlations between the abilities be written in the usual way as r_{ab} , r_{aq} , etc. As the specific factors are by assumption independent of one another, any correlation between the two abilities must be due to the *G* and would vanish if the influence of *G* were eliminated. But Yule's well known formula for partial correlations expresses the value of a correlation on elimination of a factor (Introduction to the Theory of Statistics, p. 235). By this formula, the correlation between *a* and *p* on excluding *G* is:

$$\frac{r_{ap} - r_{aG} \cdot r_{pG}}{\sqrt{1 - r_{aG}^2} \sqrt{1 - r_{pG}^2}}$$

And as this value vanishes, $r_{aG} \cdot r_{pG} = r_{ap}$; similarly, $r_{bG} \cdot r_{pG} = r_{bp}$. Hence, $r_{aG}/r_{bG} = r_{ap}/r_{bp} =$, in the same way, r_{aq}/r_{bq} . So that $r_{ap}/r_{bp} = r_{aq}/r_{bq}$, which is precisely the proportionality actually observed, making the correlation between the columns=plus unity.

twelve years ago suggested in this sense that "the total nervous energy is at the disposal of the whole nervous system"; and the suggestion elicited the cordial approval of Sherrington (*Journal of Mental Science*, 1902, Oct.). Further, the psycho-physiological work of McDougall, if not as yet reaching quite to our present problem, appears to be directly heading towards the above analysis into the two factors.

5.—MENTAL MEASUREMENT.

Thus, then, the eugenic problem from which we set out has reached a definite solution in the theory of "two factors." And here eugenics will find, it is believed, not only a refutation of popular objections, but also a general firm basis for positive investigation. In particular, this theory appears to make possible, for the first time, meaningful and reliable *mental measurement*, a matter in which previous researches have been gravely defective.

The prime necessity is to distinguish mental measurements into three classes. Of these, the first is that directly obtained from any properly conducted test; it indicates the person's total power for that particular kind of performance. The other two classes of measurement are only to be got by theoretical deduction from the first class; they refer to the two factors, general and specific.

We will consider the general factor first. Perhaps the nearest approach to it previously has been the "general intelligence," as estimated by school teachers, fellow pupils, medical attendants, prison warders, etc. Unfortunately, investigation has shown such estimation to be vitiated by errors of surprising magnitude. This erroneousness is now usually measured by means of the "reliability coefficient," or correlation between two independent estimates of the same thing; evidently, this must approach to plus unity, as the estimates become perfectly correct. When the present writer first reported the reliability coefficients for estimation of general intelligence to be as low as .64, he was suspected of exaggeration. But further inquiry has proved matters to be, if anything, worse. An extensive research has just been completed in our laboratory by Mr. Webb. Two

hundred students in a training college had their principal qualities estimated by their prefects; these were fellow students, with whom they were in continual contact. To each prefect were allotted twenty students, to be carefully observed for six months. The average reliability coefficient proved to be as low as .55.¹ Even less successful have been the estimates made in schools. Recently, the general intelligence of 1,405 children was judged, in each case by two teachers independently; the correlation between the two judgments came to no more than .47. In a second investigation involving 2,018 children, the correlation came to .50. Even more significant is the fact that when, in a further investigation, the two estimates of the same child were made by one and the same teacher, but with a lapse of nine months between them, the correlation still only came to .66. Moreover, the investigator, Waite, convinced himself that substantially the whole of this astonishing discrepancy lay with the teachers' judgments, and not with any real changes in the children.² The effect of such errors of measurement is to reduce or "attenuate" the correlation by an amount admitting of precise valuation.³ This amount is sufficient to render the correlations usually published invalid and delusory.

Nor is this all. It must be remembered that the reliability coefficient only manifests those errors which vary from one estimator to another; they say nothing about any bias common to both. This has turned out to be, at times, even more extraordinary. In Mr. Webb's research, for example, the prefect's estimates of the "quickness of intelligence" of their fellow students proved to be almost wholly based on the latter's manifestations of humour; the correlation between the estimates of intelligence and those of humour was no less than .85. Naturally enough, the humour showed no appreciable correlation with the intelligence of the students when measured in any other way, whether by the estimates which the teachers made, or by various objective tests; humour is generally recognised to depend rather

¹ Proceedings of Brit. Psych. Soc., 24-1-1914.

² Biometrika, VIII., 1911.

³ Amer. J. Psych., XV. 1904, p. 289; Brit. J. Psych., III., 1910, p. 271; Ibid., V., 1913, p. 417. The formula usually most convenient is that given at the top of p. 276, Vol. III., Brit. J. Psych.

on emotional than intellectual factors. Similar estimates by other judges appear to be little better off; some have one kind of bias, others another. If the teachers escape the bias towards humour, they fall into that towards examinational success.

A very different picture is presented by diagnosis based on the experimental determination of our general factor, the free energy of the cortex. This admits, not only in principle, but to a large extent in practice, of as definite measurement as the length of an arm or the circumference of a head. Also the probable error of the measurement can be determined at the same time. The simple formula combining both purposes is:—

$$G_x = T_x \cdot r_{TG} \pm .67 \sqrt{1 - r_{TG}^2} \quad (1)$$

where T_x denotes the result of the experimental test T applied to the person x , G_x is this person's general mental energy, and r_{TG} is the correlation between the test and the general energy.

The formula (1) is directly derivable from the theory of correlations.¹ The essential point is that, recently, a method has been devised for determining r_{TG} , thereby rendering the formula usable for our present purpose.²

It is clear that the error of G_x diminishes as r_{TG} increases. Also, it has been shown that the size of r_{TG} is enhanced by letting T consist, not of a single test, but of many tests pooled together.³

So far we have regarded only the general factor in ability and the inadequate surrogate for it presented by the popular "general intelligence." But analogous considerations apply to the specific factor also. Here, the popular surrogate is even less adequate; a person's specific ability for a performance is confused with his total power for it, although the two may in reality vary inversely. Suppose, for instance, that a child surpasses most of his fellows in the power of remembering colours; this would usually be taken as indicating a specific ability for this operation. But the child might possibly manifest an even greater superiority at most other intellectual

¹ Yule's Introduction to the Theory of Statistics, pp. 177.

² See Mental Tests of Dementia, Hart and Spearman, to appear in the next number of the Journal of Abnormal Psychology.

³ See Abelson, Brit. J. Psych., IV., 1911, p. 298; also "The Correlations of Sums" in the same journal, Vol. V., 1913, p. 417.

operations; his power of remembering colours, though good as compared with that of his comrades, might nevertheless be poor as compared with his own general ability. Physiologically expressed, the particular cortical structure subserving the operation might in itself be weak, but be rendered efficacious by the extremely high grade of the supporting energy of the whole cortex.

To determine the specific ability, then, we have first to deduct the influence of the general ability. This gives, as a first approximation, and on choosing suitable units:—

$$t'_x = t_x - G_x \quad (2)$$

where t_x denotes the total power of the person x for the test t , G_x is his general ability, and t'_x is his *specific* ability for the test. t and t' will, of course, usually refer to some single test, not to a pool of them as the T in equation (1).

6.—DETERMINATION OF THE INFLUENCE OF THE ENVIRONMENT.

Having achieved this indispensable preliminary of measuring the two factors in ability, the next task is to ascertain how far they are respectively transmissible by inheritance. The direct method of attack is a comparison between the qualities of the parents and those of the offspring. But the difficulty of effecting this in the case of the human race has led to the adoption of a less direct procedure; the attempt is made instead to determine in the first place the influence of the environment; and then, all variation not traceable to the environmental influences is attributed to heredity.

If we may believe the statements made in newspapers and public speeches by many eminent politicians, divines, sociologists, and others, the influence of the environment on general ability may be very great. Nor have educationalists been behindhand; there is not one of the ordinary studies, whether classics, mathematics, science, or modern languages, that has not been recommended for its peculiar efficacy in promoting the growth of "general intelligence." Similar claims are being put forward on behalf of manual training. During the last few months we have even been gravely assured that a general intellectual expansion may be secured by well devised dancing exercises.

Eugenic research, however, appears to have uniformly arrived at negative results; it has always reported the action of the environment to be insignificant. And this conclusion has been corroborated by the more exact work in psychological laboratories. For instance, the investigations into the so-called "formal training" have decisively contradicted the claims of particular studies to produce improvement of a general character; whenever any kind of performance has been trained, that kind—with all its constituent elements—has alone reaped the benefit.¹

This seems to indicate that the effect of training is confined to the specific factor and does not touch the general one; physiologically speaking, certain neurons become habituated to particular kinds of action, but the free energy of the brain remains unaffected.

Further corroboration may be found in the evidence as to the time at which this general cerebral energy becomes mature. This, as far as can be seen at present, is surprisingly early; the cerebral energy seems to be nearly complete by the age of puberty. The experimental determination is far from easy, and almost all the results hitherto published are vitiated by such grave errors as to be quite untrustworthy. But, perhaps, the least affected is the above-mentioned work of Bonser, and his results in this respect are given in the following table.

TABLE IV.

The percentage of children reaching each of the five grades of ability at successive tests.

Grade of ability.	Years of Age.					
	8-10	10-11	11-12	12-13	13-14	14-16
I.	5	4	2	2	4	2
II	17	9	10	8	15	10
III	31	30	27	26	21	30
IV	37	35	35	39	39	33
V	10	22	26	25	21	25
	100	100	100	100	100	100

¹ See especially the elaborate research conducted (in our laboratory) by Dr Sleight, Brit J Psych., IV, 1911.

² See his "Reasoning Ability of Children," Columbia University Contributions to Education, 1910, p 75

It is clear that the children under 10 years of age furnish a relatively small percentage in the highest grade of ability; but afterwards, if these rather surprising values may be trusted, the improvement with age is so minute as to be masked by the variations due to mere chance.

That general mental ability reaches its full development about the period of puberty is still further evidenced by physiology. For the human brain has been shown to attain its maximum weight between the ages of 10 and 15 years.¹ And since the general ability is so little affected by all the years of education after puberty, it can have but little dependence on education at all.

If this reasoning is accepted, we arrive at a conclusion of fundamental importance for eugenics. This is that, though unquestionably the development of specific abilities is in large measure dependent upon environmental influences, that of general ability is almost wholly governed by heredity.

There is, however, at present, a weak point in the above reasoning and in the whole attempt to estimate the influence of heredity through that of environment. It involves some common but questionable assumptions. In particular, the "environment" is taken in the sense of the ordinary outer world, where the sun shines and the air circulates. But does not really the environment begin where the gametes first unite into a zygote, or even earlier? If one may judge by analogy with the lower organisms, some such extremely early stages of existence engender very large non-inheritable differences between individuals. A notable example has been found in the culture of beans. When continued careful selection has secured a perfectly "pure" variety of this plant, the offspring still continues to differ largely both from the parents and from one another; some, for instance, will be much heavier and others lighter. But if the heaviest be sorted into one group and the lightest into another and both groups be further bred from, the offspring of neither group will show any advantage as to weight; nor will such differentiation appear even if the selection be continued for several generations.² If this is experimentally

¹ See Vierordt, Arch. f. Anat. und Physiol., 1890.

² Johannsen, Elemente d. exakten Erblichkeitslehre, 1914, ch. IX. and X.

demonstrable in the case of plants, there is surely no warrant for taking it to be *a priori* impossible in the case of man. It still, therefore, remains conceivable, that individual differences of general ability, though not due to environment after birth, may nevertheless be largely due to environmental influences at an earlier period, of whose conditions we have not yet any definite knowledge.

7.—DIRECT DETERMINATION OF THE INFLUENCE OF HEREDITY.

Here, therefore, the investigation of heredity through that environment breaks down. At any rate, it requires to be supplemented by other more direct procedures.

The most prominent of these, at present, is the determination of correlations between brothers or sisters. And although the earlier researches on these lines had to suffer from the difficulties that almost inevitably beset pioneering work (especially the above-mentioned "attenuation" of correlation by errors of measurement), such disturbances may well be overcome in the future. Nor is the old objection insuperable, that any observed resemblances between the brothers and sisters may be due, not to common ancestry, but to common home education, etc. This would only be fatal to the procedure as a self-sufficient mode of investigating heredity, not as a supplement to the investigation of the environmental effects.

But there still remains the difficulty arising from the above-mentioned prenatal influences. The result of these must be an undue lowering of the correlations observed between brothers and sisters. The observed values of the correlations can perfectly well furnish proof that qualities are inherited, but it is hard to see how they can ever measure the full amount of this inheritance.

Thus, there seems to be no escape from facing the problem of heredity in the most direct manner, by determining the correlations between parents and offspring. Nor does the task—in view of the psychological discoveries given in the earlier part of this paper—any longer present insuperable obstacles. Definite measurements of both specific and general ability can be made on parents and offspring alike.

The specific abilities might seem to present little interest. Our knowledge of a person's intellectual capacity is not, it might be thought, very usefully advanced by measuring exactly how well he can memorise nonsense syllables or erase the r's in a page of print. But it must be remembered that in some cases, as in word blindness, a specific inability may have very widespread and serious consequences, even for practical purposes. While for the theoretical investigation of the laws of heredity, specific abilities are likely to prove as fundamentally important as general ability itself, and they are certainly far easier to determine.¹

One often expressed fear must here be dismissed briefly. It has been said that the abilities of parents and offspring do not admit of comparison owing to the large differences of age between the two. This difficulty is to some extent eliminated by the above-mentioned fact, that general ability ripens so early. But in any case, each class can be measured according to its own appropriate standards. The feasibility of this has been demonstrated by the relatively successful standardisation of the Binet-Simon tests, although these are probably as far behind future tests as Fitch's steamboats were inferior to modern Atlantic liners.

8.—HEREDITY DEDUCED FROM THE THEORY OF TWO FACTORS.

There is yet another method of arriving at evidence concerning the inheritance of general ability. We have seen that the correlations between mental tests present such numerical relations as to be solely explicable by some general factor in all the abilities tested. The psychologists who demonstrated this fact refrained from proceeding to draw any conclusions as to how far this general factor could be considered innate. The merit of bringing forward this point belongs to Dr. W. Brown, who made the important observation that a general factor might possibly be produced by conditions of environment. He suggests the conceivability, for instance, that some of the children tested might have had a stricter discipline than the others, and

¹ It has been shown, especially by Burt, that general ability is most strongly manifested by tests involving the higher mental processes, such as reasoning, etc. And these tests present some experimental inconveniences.

thereby have gained an advantage which would serve them more or less in all the tests; that is to say, the superior discipline would furnish a general factor, exactly as indicated by the correlations.¹

Now, this idea admits of interesting developments. No one, it seems safe to assume, will think of attributing the *whole*, but only a part, of the observed correlations to such casual influences. Let us accordingly suppose that the different degrees of success at the tests are partly due to innate differences of capacity and partly to acquired differences of discipline. Each of these two kinds of influence will, naturally, have its sphere of special effectiveness. Thus, while the innate capacity might mainly make for success in tests of a highly intellectual nature, the benefits of superior discipline would be most evident in unremitting application to tests that were long and dull. But it has been demonstrated that in the case of two or more such diversely acting influences, the correlation between correlations, far from amounting to the plus unity actually found, would necessarily have a very low or even minus value.²

The conclusion seems inevitable, that the general ability indicated by Table III. does not appreciably depend, either upon discipline, or upon any other analogous influence of the environment.

To sum up, it appears that the future of research into the inheritance of ability must centre on the theory of "two factors." This alone seems capable of reducing the bewildering chaos of facts to a perspicuous orderliness. By its means, the problems are rendered clear; in many respects, their answers are already foreshadowed; and everywhere, they are rendered susceptible of eventual decisive solution.

¹ Brit. J. Psych., VI., 1913, p. 235.

² Such diverse influences would produce what has been called the "multifocal" type of correlational tables, see Brit. J. Psych., V., 1912, p. 57.

CORRESPONDENCE.

EUGENIC MARRIAGE BILLS IN THE SCANDINAVIAN COUNTRIES.

The Scandinavian countries (i.e Denmark, Norway and Sweden) are drifting slowly towards practical simplification of their everyday relations. After establishing in the last century a uniform coinage and postage, they commenced in the year 1909 efforts to establish a common code of the essentials of civil law.¹ As the first result of many conferences of delegates appointed by the Governments, there are to be introduced in the three Scandinavian Parliaments Marriage and Divorce Bills prepared by a Royal Commission in each country.

In these Bills the betterment of the human stock has for the first time in Scandinavian history been acknowledged as a leading principle in civil law; in the preamble to the Danish Bill the Royal Commission of Denmark states that "Restrictions of the right to marry based on considerations as to the health of the race are not without danger. The diseased would not be prevented from having children without marriage. But where it is claimed to be a necessity by the chief medical authorities, measures will have to be taken accordingly, though with the greatest caution. . . . It is to be hoped that the authority of law and science will make the measures effective, without doing too much harm in other directions."²

The clauses dealing with preventive eugenics in the Danish Bill are the following :—

Section 10. "A lunatic or a person feeble-minded in a marked degree must not marry." (After the approval of the Board of Health a licence may be granted³)

Section 11. "Sufferers from venereal disease in an infectious stage, and epileptics are not to marry without the other party having been duly informed of the ailment, and both parties having had verbal information by a physician on the perils incurred."⁴

After the new Bill becomes law a marriage can only be contracted on the following conditions :—

Section 22, 4. "If there is reason to suppose that either of the persons going to be married are suffering from lunacy or feeble-mindedness in a marked degree, they must produce either a certificate from an authorised physician that the party concerned cannot be proved to suffer from lunacy or feeble-mindedness in a marked degree, or a licence granted in accordance with section 10."⁵

Section 22, 5. "Each party is to produce a written bona fide declaration that there is no hindrance to the marriage for the reasons quoted in section 11."⁵

Section 45. "A consort who was insane at the date of marriage and had not got any licence according to section 10, or who was feeble-minded in a marked degree, can sue for annulment of the marriage up to six months after being cured from lunacy. If the other consort at the date of the marriage was without knowledge of the lunacy or the feeble-mindedness he can also sue for annulment of marriage within six months of obtaining the knowledge, or of the cure of the lunacy."

¹ The beginning of the inter-Scandinavian legislation may be traced back to 1880 (Bill of exchange). 1892 and 1896 two more bills were passed (Shipping Act and Sale of Goods Act).

² "Udkast til Lov om Ægteskabs Indgaaelse og Oplösning," p. 58.

³ ib., p. 7.

⁴ ib., p. 7.

⁵ ib., p. 9.

The suit must in all cases be made at latest three years after the marriage.

Section 46, 3. "Divorce. A marriage can be annulled on the suit of one of the consorts, when the other consort at the date of the marriage was suffering from venereal disease in an infectious stage, epilepsy with frequent fits or leprosy or some incurable bodily defect disqualifying from marriage."¹

Section 62. "Divorce may be granted when one of the consorts, knowing or even suspecting that he or she is suffering from infectious venereal disease, has exposed by copulation the other consort to the risk of infection, unless the other consort, being aware of the risk, incurred it voluntarily. The suit must be claimed before six months have gone by since the consort got the knowledge that he has been exposed to infection and if the said consort has not been infected the suit cannot be claimed after the disease has ceased to be infectious."

VINCENT NAESER.

¹ ib., p. 17.

ALTERATION OF AUTUMN PROGRAMME.

Owing to the War the following alterations have been made by the Council of the Eugenics Education Society in the Autumn Programme.

The Meetings of the Society announced for the first Thursdays of the month at the Grafton Galleries will take place bi-monthly this winter, starting on Thursday, October 8th, 5.15 p.m., with a paper on "Eugenics and the War," by Mr. T. Chambers.

The Lecture Course to Social Workers arranged for the Autumn has been postponed.

A Special Committee has been appointed by the Council to organise Maternity Assistance for women of the Professional Classes whose husbands have either enlisted or lost their work owing to the War.

REVIEWS OF RECENT BOOKS.

Pearson, KARL. *The Life, Letters and Labours of Francis Galton*. Vol. I.; 1822-1853; Cambridge University Press; 1914; pp. 246; price 21s.

In the Preface to this work we are told that the author was much discouraged by finding a serious gap in the material available, little information being forthcoming concerning Galton's thoughts and actions between the years 1844 and 1849. Though the impossibility of fully discussing this developmental period of his career is much to be regretted, yet we are sincerely glad that Professor Pearson's discouragement was but temporary; for, whether we look to his knowledge of the subject, or to his evident admiration and respect for the character he so well portrays, there is unquestionably no other person who was nearly so well qualified to undertake this difficult task. To say that this work is a labour of love is no mere empty phrase, but gives the true clue to the charm of this notable biography. The large volume now issued, which is profusely illustrated, takes us from Galton's birth in 1822 to his marriage in 1853, and is in time to be followed by a second volume. Many readers will no doubt consider that the work is overloaded with detail. But we must remember that a frank indication is made that it is intended as a permanent memorial to the founder of the Galton Laboratory, and that it is not written to amuse the casual reader, but for the perusal of those who for years to come will wish to understand and to know Francis Galton. Professor Pearson's aim throughout this volume has been to make the picture of a great man stand out vividly before us, and to indicate as clearly as possible the various steps of his mental development; and no item is considered too small if it serves either purpose. Such a task is full of difficulties, and the author tells us that a sense of failure grew on him as the pages took form. We think he builded better than he knew, and that his success has been remarkable. In the Preface we are also informed—and the fact is naturally of especial interest to me—that though much information concerning the family history of Francis Galton's cousin, Charles Darwin, had unavoidably been collected, and though it was advisable to place these two men to some extent in contrast, yet it was held to be unprofitable to discuss their relative greatness. Could Charles Darwin have read this statement, he would, I am certain, have thanked the author for this omission, and also for the vast labour spent in this monumental record of the life and labours of his cousin, Francis Galton, to whom he also was bound by the same strong ties of affection and regard.

To give an epitome of this volume will not here be attempted, except for the purpose of reminding the reader of the period of Galton's life which it covers. A more elaborate ancestral record is given than is usual in biographies; and this is not only appropriate in the case of one "who did so much to make the world at large appreciate the value of a good series of forbears,"¹ but was needed by the author to serve as a basis for the many subsequent allusions to the correlation between Galton's characteristics and those of his ancestors. For example, though Galton and Darwin had many qualities in common, qualities which were derived from their common ancestry, on the other hand a parallel may be drawn between their differences and the differences between the ancestral strains which they had not in common. The value of the Quaker blood on Galton's side is strongly insisted on, not far short of half his ancestry in the fifth generation belonging to that "grandly and simply stubborn"²

¹ Page 5.

² Page 29.

people, a stock purified by persecution, and maintained in its purity by frequent intermarriages. Many other distinguished ancestors are mentioned—Savile, Sedley, Collier, etc., etc., too numerous here even to be alluded to.

An account in considerable detail is given of Galton's childhood, both in his "spacious, pleasant home" near Birmingham, and at school, from which we learn that he "was a normal child with rather more"—or decidedly more—"than average ability,"¹ with an affectionate nature and with that keen sense of humour which never forsook him. There are fewer records during his later school days of any signs of ability, and certainly his teachers can claim no share in his subsequent fame. After a foreign tour on leaving school we find Galton a medical student at the age of 16, nearly a year of his training being passed at Birmingham, where the strain was excessive, and a second year in London, where he made many valuable friendships. After a second foreign tour, in which his *Wanderlust* showed itself most clearly, he entered Trinity College, Cambridge, at the age of 18, having had a far more varied experience than falls to the lot of most young men when entering on their university careers, an advantage which his elder brothers had not had, and which may therefore fairly be correlated with his own superior innate qualities. Overwork at the University, and the fact that he there became "a centre of much social life, of literary ambitions, and of varied and somewhat scattered purposes"² led to a breakdown in his health and to a poor degree. In the following year his father died, and thus ended a correspondence which not only gives a charming picture of the son's character, but also proves the existence of a most exceptionally frank, affectionate, and companionlike family intercourse. And now began the fallow years already alluded to, in which no doubt the waste of time—if it was wasted—was partly due to the necessarily slow recovery from the previous overstrain.

We have now to deal with Galton as a man with independent means, and to our surprise we find him abandoning all thought of practising medicine, and, again being seized with the spirit of restlessness, wandering off to beyond Khartoum apparently purely on pleasure bent. Then followed three years' hunting and fishing in England, with how many interludes of thought and study we know not. But after six years this fallow period ended as suddenly as it began; for in his well-known travels in Damaraland in 1850-51 he not only traversed much unknown country, but his explorations were conducted in such a manner as to win for him the gold medal of the Royal Geographical Society. His familiar letters home serve in this volume the double purpose of illustrating his character and of indicating the main features of his expedition, which included diplomatic negotiations with the natives obviously requiring much courage and judgment. He returned to England after an absence of two years, and then this volume closes with his marriage in the following year.

To those of us who knew Sir Francis Galton in his later years this volume will be doubly precious; for all who can recall his welcoming hospitality, his kindly sense of humour, his keenness of mind, his resourcefulness in details, and his determination to seek the truth in face of difficulties, must find it intensely interesting to note the appearance of the same characteristics in his earlier life. The charm of Galton's company lay not only in these qualities, but also in a certain element of unexpectedness; for one could never in the least foretell what he would say or do next. I well remember one day, which seems but a few years ago, when he astonished me by asking me to come with him to the Derby, and I have ever since repented that I did not throw aside all other

¹ Page 75

² Page 194

engagements to seize that rare chance. Needless to say that our outing would have been very different to that of the ordinary race-goer. After leaving London as late as possible and in comfort, we should have gone straight to the starting post, just in time to see the start, where we might have had the fun of seeing a jockey thrown, I was told, and with the certainty of seeing the horses in all their freshness and beauty. Then after a short scamper in the open in order to get a distant glimpse of the finish, there would have been ample time to return to town before the crowd had begun to think of moving. But I must resist the temptation of telling anecdotes about one who was both very loveable and very great, a rare combination on this earth. As to those readers who have not had the privilege of Galton's personal friendship, we believe that if they will read this volume from cover to cover, and if they will follow patiently his career "through the great and the little, through the apparently trivial and the apparently vital incidents of this story," they "cannot fail to fall in love with a nature which met life joyously, and from childhood to extreme old age resolved to see life at its best and be responsive to its many-sided experiences."¹

LEONARD DARWIN.

Hartog, MARCUS, M.A., D.Sc. *Problems of Life and Reproduction.* Progressive Science Series. London. Murray; 1913; price 7s. 6d.; pp. xx. + 362; figs. 41.

THIS is a book to know and to admire. For it deals in a fresh and interesting way with many of the fundamental problems of biology, and gives us the conclusions reached by an investigator of distinction, who has very emphatically a mind of his own. The first essay is on the significance of fertilisation, and this Professor Hartog finds in rejuvenescence. "The creation of a new cell, whose nucleus and protoplasm have not been previously associated in a common cell-life" gives individuality another chance. The saying that "Nature abhors perpetual self-fertilisation" was an exaggeration of the truth that races require rest and change. In the sixth chapter the author discusses in a very learned way all the different forms of fertilisation or syngamy, and suggests the formula that what is brought about is a distinctive re-organisation of the cell, which often leads to something new. In the second essay Professor Hartog exposes some of the difficulties that beset corpuscular theories of inheritance, such as Weismann's. The packing of the germ-plasma with various kinds of determinants becomes so complex that we are reminded of the Spanish King's comment on the epicycles required to render the universe workable on Ptolemy's geocentric hypothesis. "Had I been consulted at the creation, I could have simplified matters." We shall only note that the Mendelian theory of inheritance which is so much in vogue to-day does not seem much simpler than Weismann's. And, after all, life is a very intricate business.

The next three chapters deal mainly with cell-division, which is a central problem in biology. The power of spontaneous division is one of the most characteristic differences between the living and the not-living, and any light on the instability that makes a unit divide is most welcome. Professor Hartog draws a useful distinction between constructive processes leading directly to an increase in the living substance and those leading to the accumulation of reserves which become available by the action of an internal ferment. One cannot help speculating as to the possibility of some "autokatalysis" being at the bottom of cell-division, but Professor Hartog's contribution, which is of great interest, is on another line. He finds evidence of "mitokineticism, a new dual heteropolar force," quite different from surface tension, osmosis, electrostatic force, or the like.

The next two chapters show in a lively way that there is a good deal to be said for the Lamarckian theory of the transmission of indi-

¹ Page 4.

ividually acquired structural modifications. There is quite a considerable amount of hard-hitting, all good-humoured, of course, and very dexterous. Professor Hartog has a strong sympathy with the mnemic theory that the germ-cell in some unknown way garners the imprints of some of the organism's experiences, and that these may have their outcome in development. "For the present, at least, the problem of heredity can only be elucidated by the light of mental, and not material, processes." His essay on the biology of Samuel Butler is very good reading. The volume ends with a valuable essay on "interpolation in memory" and some wise counsel on "Nature Study."

We have not forgotten the philosophical chapter on "Mechanism and Vitalism," which appears to us to be the best of the many good things in Professor Hartog's book. It is an admirable statement of the apartness of "vital behaviour," which is self-preservative, self-regulated, and adaptive. The concluding paragraph should be writ large, "We may distinguish all aggregates of matter into three classes:—

"(1) *Organisms*, which grow and store energy and matter for their needs and for those of their lineage, and which reproduce, and are self-regulated;

"(2) *Machines*, which are aggregates of matter not in continuity with organisms, and which are selected, constructed, or formed by an organism for the purposes of the organism itself or of its race;

"(3) *Things at Large*, which do not come into either category, and which are conditioned by their antecedents only."

We have to thank Professor Hartog for these valuable essays, which should be read by all interested in the general problems of life and reproduction. We wish, however, that he could find time to write a book more perfectly unified and with less allusion to other people's right and wrong notions—expressive, in fact, of his own very distinctive outlook.

J. ARTHUR THOMSON.

Drage, GEOFFREY. *The State and the Poor.* London and Glasgow. Collins; 1914; pp. 264; price 1s. net.

MR. DRAGE's book is written rather from the point of view of a Poor Law reformer than of a eugenist. Pauperism in general, in his view, "is the result of the defects of our industrial and in a lesser degree of our educational system" (p. 235). More particularly for the able bodied pauper is the main crux of the situation, "the industrial system is responsible." Even the vagrant he approaches with the open heart and hand of the social reformer. "Care should be taken," he tells us, "to provide that every man should have a chance in the first instance and hope even in the last resort." In dealing with the feeble-minded, indeed, he quotes approvingly the view of Mr. W. H. Dickinson, that our policy as to the feeble-minded mother is a source of the gravest social danger, and is "eating into the very vitals of our nation." But he mitigates this judgment by quoting also the opinion of Mr. Charles Booth, who thinks that "the evil is summed up in a certain number of unsatisfactory babies, most of whom die" (68), while at the same time like all the more enlightened reformers he would concentrate attention on the improvement of the chances of the children, for whom he draws up a comprehensive programme in the short chapter of "conclusions." Apart from what he says, with less, I think, than his usual fullness of information, in the "dry facts" of latter day elementary education, his remarks here might be accepted as the basis of a new Poor Law policy in which all reformers might well unite.

For the rest, his book is a masterly summary of the present state of Poor Law administration, and might have been published by the Majority as a sequel or supplement to their Report of 1908, on the understanding that it was prepared to drop its own proposals as to the new authority, and adopt those of Mr. Charles Booth and Sir Arthur Downe, and to see in much that has since taken place an invidious attempt on the line

of the Minority's recommendations, "to ignore the existing machinery in dealing with the poorer classes." The believer in the Minority Report will not be expected to agree with the main line of the book, though even he will find much to be grateful for in so succinct and up-to-date a statement of the Majority's point of view in general, and for many of the suggestions as to the treatment of children, of widows with children and the industrially incompetent, in particular.

Those on the other hand who take a more detached view of this historic controversy may well agree with his fundamental principle, that "the wages of the working man ought to be sufficient to enable him to make proper provision for the welfare of his family, for his own old age, and for times of sickness" (236). Before, however, assenting to the suggestion that the greater part of recent legislation for the benefit of old-age, for school hygiene and National Insurance is in reality a system of "State doles," they will ask for a more discriminating analysis of the present industrial situation. Granted the validity of the above ideal, what are the main sources from which the wages may be increased to enable us to realise it? What is the relation between the actual and what we might call the real wages of labour, which include free education, cheap tram fares, etc.? What hope is there in the near future of the requisite advance? And what in the meantime is the least "doleful" method of assisting the labourer to this larger share of direct civic responsibility? In view of these questions which ought to concern one who holds that poverty is the result of the defects of our industrial system more than, to judge from this book, they seem to do, is there not something to be said for the policy which was the kernel of truth in the proposals of the Minority Report, viz., that before we set about reorganising the Poor Law authority on a large scale, we should do what is possible by school medical inspection, improved industrial training, unemployment and sickness insurance, improvement of workshop conditions, enforcement of minimum wage, to reduce the problem of poverty to its real dimensions? It must seem to many, besides the present writer, far too early to dismiss the greater part of these efforts as merely disguised "assistance," and the new system of taxation which has been devised, not, of course, by the present Chancellor alone, to find the means for constructive social reform, as a mere "rake's progress."

J. H. MUIRHEAD.

Malinowski, B., Ph D. *The Family Among the Australian Aborigines.*

London. University of London Press; 1913; price 6s. net; pp. 326. FEW wild races have been more extensively and closely studied than the Australian Aborigines, yet the accounts rendered are mutually inconsistent and contradictory to an extraordinary degree. This is particularly unfortunate, since these natives are so valuable a document for the study of social evolution. Dr. Malinowski, in this valuable monograph, collates and analyses the whole literature of the subject, and has succeeded in producing order out of chaos. His aim is to arrive at the actual existing state of society. To carry it out he has followed the excellent methods of historical analysis and interpretation of evidence instituted by Langlois and Seignobos, and has avoided the temptation (responsible for much of the inconsistency of the records) to allow theory as to origins to colour presentation of facts.

Taking the much-vexed question of "group-marriage" as an example, we find the author's analysis inevitably long but very judicious. He arrives at what is probably the true state of affairs, viz., that individual marriage exists and is the fundamental element, but that social interests have developed or allowed a certain amount of sexual communism, which is a very different thing. It is just the same in the economic sphere, every individual has a right to take toll from this or that individual. The author rightly insists that the sexual relation is not the whole of marriage, and he points out that the "group-marriage"

system is entirely sexual. As regards kinship, the view that the Central Australians ignore the part played by the father in procreation is accepted too readily by the author. Mr. Walter Heape's criticism of this view seems to be final, viz., that for certain reasons (analogous to those which produced the idea of the Immaculate Conception) the Australians have intentionally ignored what they really knew very well. An excellent feature of the author's study is that he takes into account the facts of daily life, the emotional side of family relations, and the magico-religious ideas about kinship and so forth. He quotes his documents at full length, an excellent practice. The fascinating subject of Australian family organisation, so difficult to follow in the multifarious literature, is here presented in a most readable and well-digested form, and this one volume gives the student the whole of the subject. It is indispensable to sociologists. Eugenists will find its data and inferences very valuable for a study of the connexion between the morphology of the family and the welfare of the race.

A. E. CRAWLEY.

Greenwood, ARTHUR. *The Health and Physique of School Children.* London. P. S. King and Son, 1913 (for the Ratan Tata Foundation); price 1s. net; pp. xv. + 96.

THIS volume contains an account of an investigation commenced in the Economics Department of Huddersfield Technical College by Mr. George H. Woods, F.S.S., and completed by Mr. Greenwood, the head of the department. It is based on the records contained in the annual reports of school medical officers who give averages of the height and weight of the children under their supervision, arranged according to age. These records have been accumulating since the passage of the Education (Administrative Provisions) Act of 1907, and a statistical summary of a considerable proportion of them, such as is contained in the volume under review, should receive a hearty welcome, particularly from those who are in a position to realise the large amount of labour involved in its preparation. The number of children dealt with exceeds 800,000, so that it may be concluded that the general results obtained are based on sufficient data to be reliable. A system of index numbers is employed for the purpose of making comparisons between different districts with regard to the physical development of their children. These numbers are arranged in four series. Boys' height, boys' weight, girls' height, and girls' weight are calculated for each age by dividing the average measurement at that age for the group dealt with by the corresponding average for the whole of England and Wales and multiplying by 100. To make this process clearer we will take a particular case. Suppose the average weight of seven-year-old girls in Berkshire is 47·9 lbs.; in the whole of England and Wales it is 46·6 lbs. Therefore the index number for the weight of seven-year-old girls in Berkshire is $100 \times 47\cdot9 \text{ lbs.} \div 46\cdot6 \text{ lbs.}$, or 102·8. Having calculated the index number for each age the general index number for the group or district can be obtained by taking the average of all ages. This process facilitates comparison between different districts.

Applying the method just described to the task of comparing the effects of town or country life we obtain the following table:—

	Index Numbers.			
	Boys'	Boys'	Girls'	Girls'
	Height.	Weight.	Height.	Weight.
County council (rural areas) ...	101·4	... 103·3	... 101·6	... 103·1
County council (urban areas), i.e., small towns ...	100·2	... 100·5	... 100·6	... 100·8
Manufacturing towns ...	98·7	... 97·9	... 98·2	... 97·0

This table shows that elementary school children are on the whole better developed physically in the country than in small towns, and in

small towns than in large, and leads one to question whether the agricultural labourer is so badly off as he is sometimes represented.

Another interesting application of the method is to the study of the effects of child labour on the development of the child. In Bradford children of the age of twelve are allowed to spend half the day in school and the other half-day earning wages. This is known as the half-time system. Mr. Greenwood shows that the average of the height and weight indices (the combined index number) is low in Bradford for children of twelve years old. Its value is actually 95·7, whereas for children of eleven in Bradford it is 99·2, and for children of twelve in Leeds, Sheffield, and Wakefield, where the half-time system is not in use to so great an extent, it is 97·4, 97·8, and 96·8 respectively. He argues from these figures that the half-day's labour has a deleterious effect on the physique of the child, a result which seems natural enough and is supported by evidence of another kind brought forward in another section of the work. But he makes no mention of the fact that at thirteen years the combined index number goes up again in Bradford to 98·7, which is considerably higher than the corresponding index in Leeds, Sheffield, or Wakefield. In presenting the figures without mentioning this Mr. Greenwood shows a certain bias, at any rate a strong desire to arrive at his conclusion rather than let the statistics lead him where they will. In Oldham the material allowed a direct comparison between the half-time children and those who spend the whole day at school. But the half-timers are throughout larger and heavier than the full-timers. The explanation of this unexpected result is given by the medical officer for Oldham as follows : "(1) That those working half-time are on the average older than those not working; (2) that the tendency would be for the stronger and better developed children to go to work, while the weaker and delicate children would be kept at school; (3) that the worker, as he is bringing in a wage, is better fed than those who are not wage earners." Possibilities which might have an opposite tendency, as for example, that the children of the poorer parents were more likely to be sent to work, are not considered. The question is thus seen to be a complicated one, which will not be solved without the collection and reduction of better data. This should present no particular difficulty, as the exact age of the children in the two groups, their physique, and home conditions might without difficulty be removed from the realms of conjecture and properly allowed for. But though the simple comparison made in the work under review cannot be said to have led to a definite conclusion, it is not for that reason without value as it serves to point the way for future work.

We will conclude by tempering the wind of general commendation which issues naturally from us, by the question, "Why are the diagrams so very sketchy?"

EDGAR SCHUSTER.

Pearl, R. *A Contribution towards an Analysis of the Problem of Inbreeding*. Amer Nat XLVII.; 1913; pp. 577-614. *Genetics and Breeding*. Science XXXVII; 1913; pp. 539-546; and Parshley, H M. *Data on Sex-Determination in Cattle*. Biological Bulletin XXIV; 1913; pp. 205-225

In the first of these papers Dr. Pearl presents a method for determining the intensity of inbreeding. He points out that it is important to start from the individual and work backwards into the ancestry, rather than to start from the ancestry and work downwards. The method adopted consists in finding a coefficient which shall represent the ratio of actual ancestors in any generation to the total possible number of ancestors. For example, if brother is mated with sister for three successive generations, the offspring will have only two great-grandparents instead of the eight which they would have if there were no inbreeding. Three-quarters of the ancestors in that generation have thus been eliminated, and the coefficient of inbreeding for the three generations is therefore 75 per cent.

More generally, if n is the number of generations in the pedigree, p the possible number, and q the actual number of ancestors in n th generation, then Z_n the coefficient of inbreeding for n generations is given by the formula $Z_n = \frac{100}{p_{n+1}} (p_{n+1} - q_{n+1})$.

Dr. Pearl points out that in repeated brother-sister mating Z_n soon approaches 100 per cent., so that if no effects are produced in a few generations, any subsequent changes are probably not due to inbreeding as such. Practical methods are given for working out the coefficient in long and complicated pedigrees. The latter part of the paper discusses the relation of inbreeding with continued self-fertilisation, but contains a mistake which vitiates a considerable part of the argument; this mistake is corrected by the author himself in Amer. Nat. XLVIII., p. 57.

The second paper is the presidential address to the Animal Section of the American Breeders' Association, 1913; it points out the importance of the knowledge of the recently discovered principles of heredity in checking the empirical methods commonly used by breeders of animals.

In the third paper the authors have collected records from breeders of 480 births in cattle, in which it was known whether service by the bull took place "early," "in the middle," or "late" in the heat period of the cow. The "early" class contained 248 births, with 125♂, 123♀; the "middle" class contained 125 births, 67♂, 58♀; the "late" class contained 107 births, 65♂, 42♀. The ratio of males to females thus rose from 98·4♂, 100♀ in the "early" class to 115·5♂ 100♀ in the "middle," and 154·8♂, 100♀ in the "late" class. It is concluded that these changes in the sex-ratio cannot be ascribed to any known cause except the difference of time of fertilisation, and that possibly "staleness" of the ovum may tend to destroy the activity of a female-determining chromosome, and allow the ovum to develop into a male.

L. DONCASTER.

Laughlin, H. H. *Report of the Committee to Study and to Report on the best practical means of cutting off the Defective Germ Plasm in the American Population.* I. The Scope of the Committee's Work. II. The Legal, Legislative and Administrative Aspects of Sterilization. Eugenics Record Office. Bulletins 10A and 10B. Cold Spring Harbour, Long Island, New York; 1914; Prices 20 cents. and 60 cents; pp. 64 and 150.

BULLETIN No. 10A appears to cover the whole scope of negative eugenics. First the numbers of "Socially inadequate in the American population" are estimated, and then "Cacogenic varieties of the human race," that is to say those who are socially unfit on account of defective inheritance, are classified with great minuteness. The ten main classes to which they are referred are the feeble-minded, paupers, inebrates, criminals, epileptics, insane, the asthenic class, the diathetic class (*i.e.*, those who have a tendency to some specific ailment). The deformed and the cacaesthetic (those suffering from hereditary defects of the sense organs). The remedies which have been proposed "for purging the blood of the race" from the defects enumerated then receive consideration. They are catalogued as follows. 1. Life segregation. 2. Sterilization. 3. Restrictive marriage laws and customs. 4. Eugenical education of the public and of prospective marriage mates. 5. Systems of matings purporting to remove defective traits. 6. General environmental betterment. 7. Polygamy. 8. Euthanasia. 9. Neo-Malthusianism. 10. Laissez-faire. We rather suspect that numbers 7, 8 and 10 were put in owing to the committee's affection for the decimal system. In any case they are dummies easily knocked down. Neo-malthusianism also receives rather scant courtesy, and the efficacy of any "systems of matings purporting to remove defective traits" is questioned. "General environmental betterment" is briefly conceded its place as a necessary part of social reform,

but is regarded as inadequate by itself. Restrictive marriage laws and customs are dismissed as unlikely to affect the "socially inadequate classes." For the more defective among them life segregation is the remedy indicated, and sterilization is advocated "only as supporting the more important feature of segregation when the latter agency fails to function eugenically." Eugenic education is commended as having an important place to fill, but the committee do not seem to realize that without it none of the other remedies can be made effective, because they will not have sufficient backing of public opinion.

Bulletin No. 10B is a most useful record of legislation which, however it may be criticised, is an experiment of great interest. Its essential features were communicated to the first Eugenics Congress by Mr. Van Wagenen (*Problems in Eugenics*, Vol. I., p. 460), and so do not require detailed notice on the present occasion. It is however worth while to mention that some of the cases which were brought before the Courts in America arising out of these laws are reported in the bulletin, together with full particulars of the laws themselves, and Bills of a similar nature which were introduced in some State legislatures, but did not reach the statute book.

EDGAR SCHUSTER.

Fairchild, H. P. *Immigration*. New York. The Macmillan Company; 1913; price 7s. 6d.; pp. XI. and 455.

THE problem of immigration is one of vital importance to America. Since the original English colonisation at the beginning of the seventeenth century the increase in population has been effected to a predominant extent in this manner, and at the present day the stream of immigration flows in an ever widening channel. The volume under review is an attempt to describe the sources, course and conditions of American immigration from the earliest times until the present day; to study the fate of the immigrants in the country of their adoption, and from these considerations to arrive at some solution of the immigration problem. This problem Mr. Fairchild states in the following words: "In the first place, it must be decided whether it is desirable for nations consciously to interfere with, and try to control, such a natural movement as this; secondly, if interference is to be undertaken, whose welfare is to be held prominently in view?" "There are four possible standpoints open to choice. First, that of the United States; second, that of the countries of source; third, that of the immigrants; fourth, that of humanity in general."

In the historical and descriptive portions of the book Mr. Fairchild has achieved a high measure of success, but when he attacks the exceedingly complex and difficult questions indicated above, though he is always interesting, he sometimes appears rather superficial. For example, when he says "the question of the desirability of immigration from the point of view of humanity as a whole, . . . is a summation of the aspects of the problem from the point of view of the United States, the countries of source, and the immigrants," he entirely disregards the effects which the economic and ethical conditions of the countries primarily concerned must have on the whole civilized world. Also his treatment of the biological effects of immigration—the aspect of the question most interesting to eugenists—is of an unsatisfactory nature. He is, perhaps, not to be blamed for dismissing the important question whether race mixture is beneficial or harmful with the statement that the authorities seem equally divided, but when he discusses the effects of immigration on the rates of increase in the various racial constituents of the American nation he neglects much that is in the highest degree relevant. Thus he affirms that the recent decline in the native birth-rate is due to economic pressure caused by competition with backward peoples from south-eastern Europe, accustomed to a very low standard of living, of whom the stream of immigrants is now principally composed. That a corresponding

decline, for which no such cause can be assigned, has affected the birth-rate of all the more civilised European nations during the same period is entirely ignored, which shows that this question has not been at all deeply considered. The relations between birth-rate, density of population and standards of living are also matters which seem much simpler to Mr. Fairchild than they actually are, but in spite of all these faults the book may be commended as being most interesting and provocative of thought.

EDGAR SCHUSTER.

Aldrich, M. A., Carruth, W. A., Davenport, C. B., and others.
Eugenics. Twelve University Lectures. New York. Dodd,
 . Mead and Co.; 1914; pp. XIII. +348.

THE progress of the eugenic movement both in the realm of practice and in the realm of science depends largely on the success of the educational campaign. This is obvious in the case of practice, and though less obvious in the case of the science, is equally certain. For experience shows that science advances most rapidly and with surest footsteps when some benefit to mankind is its immediate goal, and the object of the educational campaign is to disseminate the conviction that the practice of eugenics will confer benefits. The practical end stimulates both scientific workers and their paymaster, and on the activities of the latter the numbers and energies of the former in some measure depend.

Thus when Mrs. Huntingdon Wilson endowed a lecture at 32 of the universities in the United States she earned the gratitude of all who have the interests of eugenics at heart, and in publishing twelve of the lectures together in the volume under review she has again laid them under a debt. Acknowledging this, we yet feel bound to say that the work as it stands cannot be recommended as a satisfactory introduction to the subject. For the novice who has the perseverance and energy to read a book of this length does not want to start the subject twelve times over and to be introduced again and again to Mendel and the Jukes and the Kalikaks, any more than a person desirous of climbing the Matterhorn would be satisfied with an equivalent number of walks up Primrose Hill. Nevertheless it must be understood that this is a criticism of the necessary arrangement of the book, and not of the quality of its contents. Although the twelve lectures are not conspicuous for novelty, the method of presentation of their subject matter is in most cases well calculated to have aroused the interest of the audiences who listened to them, and to have convinced them of the soundness of the eugenic appeal. They are the more forcible because characterized by moderation and common sense. It is impossible to notice each separately so we will pick out for special mention "The First Law of Character-Making," by Dr. Holmes, of the Pennsylvania State College. Quoting largely from "Rabbi Ben Ezra," he starts by contrasting character as shown in aspiration "What I aspired to be and was not," and in doing "The vulgar mass called work," and supported by Carlyle's "Know thy work and do it," inclines to the view that the latter is more important, at any rate from the point of view of the eugenist. He then points out forcibly with many instances how largely character as shown thus is dependent on parentage, and concludes with a plea for the eugenic ideal in marriage.

The subject of character and intellect is also treated by Professor Thorndike, the psychologist, and his lecture is well worth reading, as it contains an answer to an objection commonly made to eugenics in words more or less like these, "Even if you know the laws of heredity and how to effect selective breeding in man you would not know what qualities to select for."

It is interesting to note in these lectures how seriously the problem of selecting immigrants is being considered in America, and this leads us to speculate whether Professor Ellwood, another contributor

to the volume, was in any degree the result of Irish immigration. Some such origin seems indicated in his treatment of race mixture, when he recommends that marriages like those between whites and negroes should be prohibited until we know more definitely what sort of results they give.

EDGAR SCHUSTER.

Garofalo, BARON R. *Criminology* (translated by R. W. Millar). London. Heinemann; 1914; price 16s. net; pp. 478.

THIS well-known work was first published at Naples in 1885. A French version which was prepared under the auspices of the author went through five editions. Of these, the most recent, which appeared in 1905, was completely recast by him and forms the original of the present version. Baron Garofalo is primarily a lawyer, and the legal aspects of the treatment of criminals rightly receives a full share of attention, but it is owing to the fact that he realizes the necessity for basing the reform of the criminal and the protection of society on a thorough knowledge of the natural history of the crime, that his great work has been written. The translator has done his work adequately, and the get up of the book is a credit to the publishers.

Creighton, LOUISE. *The Social Disease and How to Fight It. A Rejoinder.* London. Longmans, Green and Co.; 1914; price 1s.; pp. 87.

AFTER the recently published literature dealing with the problems of prostitution and venereal disease from the pens of various writers both at home and abroad, it is indeed a relief to have this calm and reasoned statement of the case by one who has had far-reaching experience of the special problems under discussion. After the recommendations of extremists—ranging from the segregation under conditions approximating to slavery of a group of women who, it is argued, must be so maintained owing to the inherent polygamous character of the race, to an extension of the franchise to women as a means of abolishing prostitution—it is a relief to turn to the dignified recognition of mutual responsibility of both men and women for the existing state of affairs, and the possibility that their joint efforts to solve the problem may lead to a measure of success in the near future.

Mrs. Creighton fully realises the racial effect of the diseases, and advocates as the immediate policy careful education of the public, and the provision of free treatment, as being the only sure method of reducing the disease and the direct road to the formation of a standard of public opinion which will recognise both the ethically and socially injurious nature of prostitution. The origin of the problem lies in the social custom of prostitution and a uniform standard of morality for both sexes is recognised as its only true and final solution.

The recent tendency to use the social evil as a ground for sex antagonism has been deeply deplored by many men and women concerned in the attempt to improve conditions. It is only by co-operation between the sexes that any real progress can be made. It is the recognition of this principle that is so warmly welcomed. The race is composed of men and women, and neither part can make real progress without the other. Mrs. Creighton urges care in the dissemination of knowledge, but emphasises the need of right instruction, education during childhood in the simple physiological laws of life, clear warnings as to the prevalence and danger of disease for those going into the world, the need of medical co-operation in supporting the principle of chastity before marriage as a hygienic as well as a moral duty, the provision of free and adequate treatment of disease, public recognition of the danger of marriage until treatment is completed, an extension of the feeling of parental responsibility, and above all the cultivation by women and men together of a healthy public opinion.

S. G.

Galton, SIR FRANCIS. *Hereditary Genius.* London. Macmillan and Co.; 1914; price 5s. net; pp. 379.

THE Eugenics Education Society ought to be especially grateful to Messrs. Macmillan and Co. for reprinting and bringing out a cheap edition of this classical work, a step taken, we believe, mainly owing to a suggestion made to them from this office. The first edition appeared in 1869, and we are told in the preface of the 1902 edition, from which this is a reprint, that Sir Francis Galton felt that the labour involved in a thorough reconstruction necessary to bring it up to date was more than he could undertake. In reading these pages we must therefore remember that they were written not very far short of half a century ago.

Perhaps the greatest service which Galton rendered to the cause of eugenics was the proof he gave that mental qualities are inherited in the same way as bodily characteristics; for, previously to the publication of "Hereditary Genius," even Darwin was of opinion that "men did not differ much in intellect, only in zeal and hard work." As far as the ordinary public were concerned, Galton was breaking up entirely new ground and we ought not, therefore, to be surprised when he tells us that this work was, when it was published, "subjected to much criticism, no small part of which was captious or shallow." It is not necessary here to describe in outline what is contained in this storehouse of information, for anyone working at this subject is certain to have to refer to the book itself. Like all Galton's works, it is rich in observations made by the way, and certainly a second reading will amply repay the reader.

L. D.

Michels, ROBERT. *Sexual Ethics: A Study of Borderland Questions.* Contemporary Science Series. London. Walter Scott Publishing Co.; 1914; price 6s.; pp. xv. + 296.

A PRIMARY aim of this study, as the author quaintly says, is to wage war upon fig-leaves, and many will sympathise with his desire for frank scientific discussion and for judicious sex-education. It may be doubted, however, whether details in regard to the imperiousness of sexual desire, or man's unnatural offences, or the tragedy of prostitution make for edification in a popular book of this sort. It is required of all of us that we should try to love out of a pure heart fervently; but is there any profit for us in pathological information which has not some very definite moral or piece of scientific advice attached to it? We shall briefly indicate some of the author's positions.

"The primary ethical foundation of every sexual relationship must be the deliberate consent of both participants in the sexual act"; but there are surely other ethical considerations not less primary! The author is not pleading for "free love," which he condemns, but for tolerance of the Don Juan type of man if he exhibits "the primary attributes of sexual morality . . . loyalty and truth." If he has these, and if the successive women give themselves to him with a free spirit and full awareness, then "the basic principles of ethics" are not infringed. We do not share this view of ethics or this tolerance of social pests of the domesticated canine type.

The prostitute is regarded as the "old maid" of the proletariat, and the author rightly says that what we need is "the collective prophylaxis of prostitution through an evolution of all our methods of production, and in addition of our ideas of education and of general social hygiene." We do not think that the details given as to the various types of prostitution were at all necessary in order to substantiate the sad truth that there is an economic factor in its maintenance.

The author discusses the dangers of playing with the fire of sexual impulses, and of ignorance on the woman's part. He points out, on the other hand, what is sometimes overlooked, that a wanton girl may tempt a man beyond endurance, and that there may be great injustice in legislation which is protective of the girl only.

While the moral ideal of a man's sexual life is regarded by the author as strict monogamy—chastity before marriage and faithfulness after—he is doubtful whether this corresponds to the inherent tendencies and feelings of the average man, and thinks that, generally speaking, the men who remain chaste are men of little worth. He hopes that we may develop towards a state in which "the number of instances may be diminished in which the first love and the first lover are not coincident," but he does not think that this desirability will be postponed by a greater toleration of lack of control. Our own judgment is that the way out is by heightening not lowering the standard, and we regard his depreciation of the continent as untrue and unwholesome. We believe also that he exaggerates what may be called the normal imperiousness of sexual desire. This varies, of course, with race and other variables, but there is much reason to believe that man often allows himself to drift into hyper-eroticism and then supposes or tries to suppose that this is "natural."

The author is so much impressed with the evils of "honeymoons" that he discusses, in a hesitating sort of way, a change, for the elect at least, in the existing morality of the betrothal period. He seems to us on sounder lines when he protests against the general loss of the woman's family name when she marries, and against the impertinent distinction between Mrs. and Miss. We agree also with his plea for making more, not less, of the organic factor in love, and with his argument for the ethical justification of consciously regulated sexual intercourse within the bonds of matrimony. We differ from the author mainly in rejecting as ethically unsound his apology for the Don Juan and his compromise in regard to chastity. We think, too, that there are many details in the book that are unnecessary and unwholesome, and that there is much which he would not have written if he had enjoyed some acquaintance with "puritan England."

J. ARTHUR THOMSON.

OFFICIAL PUBLICATIONS.

STATISTIQUE INTERNATIONALE DU MOUVEMENT DE LA POPULATION. Vol. II., Années 1901 à 1910. (Ministère du travail et de la prévoyance sociale Statistique générale de la France). Paris, Imprimerie Nationale, 1913. Pp. xxxviii. + 163* + 298; 8vo.

In 1907 the *Statistique Générale de la France* published a first volume of international vital statistics, which included data for all available countries from the origin of registration up to the year 1905. The present volume continues the work up to the year 1910, but for convenience of reference the data are given for an entire decade, and not only for the five years 1906-1910. The first part of the volume consists of an introduction by M. Lucien March (pp. I.-xxxviii.). This is followed by a general discussion of the data for the decade (pp. 1*-163*), and finally, in the last part (pp. 1-298), the detailed tables are given with the absolute figures for each year. Any data that came to hand too late for inclusion in the earlier volume, though referring to years prior to 1901, are also published in the present volume. These include, for example, several life-tables for the decade 1891-1900.

During the decade 1901-10 the birth-rate and death-rate have alike continued to fall in the vast majority of the countries for which we have data, but the fall in the former has been in general the greater so that the rate of natural increase has dropped. In England the birth-rate fell between 1901 and 1910 from 28·5 per thousand of the population to 25·8; in Denmark from 29·7 to 28·2; in Austria from 37·3 to 32·6; in Hungary from 38·9 to 35·7; in Holland from 31·8 to 28·6; in France from 22·0 to 19·5; in the German Empire from 35·0 to 29·8. The fall in the case of some of the component States of the German Empire is remarkable; thus in Saxony the rate dropped from 35·9 to 27·2 or by practically 25 per

cent. To the almost universal rule of a fall in the birth-rate there are very few exceptions. Italy is one of the most remarkable, the birth-rate, apart from some fluctuations, having been practically stationary, viz., 32·5 in 1901 and 32·7 in 1910. The same is the case in Ireland, and in Australia and New Zealand also the fall seems to have been arrested.

Against the above-mentioned decreases in the birth-rate may be set decreases in the death-rate, in England from 16·9 to 14·6 per thousand; in Denmark from 15·8 to 13·3; in Austria from 24·9 to 21·3; in Hungary from 27·1 to 23·6; in Holland from 16·3 to 13·6; in France from 20·1 to 19·1; in the German Empire from 19·4 to 16·2. In Italy the change is very slight, the rate being practically stationary, viz., 22·0 in 1901 and 21·7 in 1910. In the Australian Commonwealth the death-rate, already remarkably low at the commencement of the decade, fell from 12·2 to 10·3, while in New Zealand it has remained practically stationary at a level slightly under 10 per thousand. It must be remembered that the above are crude death-rates—the simple proportions of deaths to every thousand of the population—and are therefore affected largely by the age and sex-compositions of the several populations in question. The rates cannot be compared as measures of the conditions affecting health in the several States. What we most miss in the present volume is a series of standardised death-rates for the different countries, all based on one and the same standard population. Possibly M. March might be able to attempt this in the next volume.

Space does not permit of any detailed examination of the data relating to causes of death, but a glance at the figures for infantile mortality may be of interest. In most of the countries of Europe this fell during the decade, but in some cases the fall has been but slight. In Austria and Hungary though the rate was appallingly high, little improvement has been effected. In Austria the deaths of infants under 1 year of age per thousand births averaged 216 during the years 1901-5, 202 during 1906-10, the corresponding figures for Hungary being 212 and 204. In Germany on the other hand the improvement has been considerable; for the Empire as a whole the rate fell from 199 deaths per thousand births in the first quinquennium to 174 in the second. In Bavaria the rate fell from 240 to 217 per thousand, and in Saxony from 246 to 198. The lowest rates are shewn by New Zealand and by Norway which both experienced only 70 deaths per thousand births during the quinquennium 1906-10. In England the rate fell from 138 per 1000 during 1901-5 to 117 in 1906-10. The great waste of life implied by the high rates of infantile mortality ruling, for example, in Germany, is well illustrated by some of the life-tables given. Few of these have yet been published for the decade 1901-10, but we can compare, as two extremes, Germany and the Commonwealth of Australia. In the German Empire on the average of the decade 1901-10, of 1,000 males born alive only 798 survived to 1 year of age; in Australia as many survived to age 32.

A special section of the second part of the volume is devoted to a study of the statistics of divorce, which should be useful in view of recent discussions. It includes brief notes as to the law of divorce in each country.

M. March and the staff of the *Statistique Générale de la France* deserve the hearty thanks of all students of vital statistics for the time and labour devoted to the compilation of this most useful volume.

G. U. Y.

BIRTHS, DEATHS, AND MARRIAGES IN ENGLAND AND WALES (1912).
Seventy-fifth Annual Report of the Registrar-General. 1914.
[Cd. 7028] Price 5s. 9d. Pp. cxii. + 611.

"The salient features of the vital statistics of 1912 are as follows:—The marriage-rate was 15·5 per 1,000, being 0·1 above the average for the ten years 1902-1911. It is satisfactory to note that in each of the three years 1910-1912 the marriage-rate has shown an increase upon that in the preceding year. The provisional figures for 1913, however, do not indicate a continuance of this rise, the rate remaining at 15·5 per 1,000.

"The birth-rate in 1912 was 23·8 per 1,000, and was 3·0 below the average for the preceding decennium; it was the lowest rate on record, being no less than 0·6 below that of 1911, which was the next lowest."

The death-rate in 1912 was 13·3 per 1,000, and was 1·9 below the average for the ten preceding years. It was the lowest rate on record, being 0·2 per 1,000 below the lowest previously recorded, that in 1910. Although the climatic conditions of the two years were very similar the advantage of 1912 was mainly due to greater diminution of the mortality of children under the age of five years.

Infant mortality was 95 per 1,000 births, being 30 per 1,000 below the average for the preceding decennium. It was the lowest rate on record, being 10 per 1,000 births below the lowest rate previously recorded, that for 1910. It is of interest to note that if mortality from diarrhoea—naturally low on account of the cool and wet summer—is excluded from the comparison the infant mortality of 1912 still remains the lowest yet recorded."

"Cancer caused a higher death-rate both among males and among females than in any preceding year, but the rate from tuberculosis as a whole was the lowest on record."

The data on which the general results summarized above are based have been analysed and tabulated in a detailed and lucid manner by the new and improved methods which were introduced in 1911. The data themselves admittedly leave much to be desired, but their improvement would involve fresh legislation providing for a complete revision of the present system of registration. Such legislation the Registrar-General refers to as most desirable both from the administrative and statistical standpoint.

The special features of the present report are (1) the detailed treatment of the deaths in 1911 and 1912 from syphilis and diseases dependent on it, based on the report prepared for the information of the Royal Commission, and (2) the tabulation of births registered in 1911 by parents' occupations.

(1) Although the deaths certified as due directly or indirectly to syphilis are not regarded as giving a reliable basis for an estimate of the mortality truly attributable to this disease, they are a useful indication of its relative prevalence in different localities and in different social groups. It appears to be far more common in large towns than in rural districts, and among the highest and lowest social strata than among the remainder. Miners, weavers and agricultural labourers seem particularly free from it, and unskilled workmen particularly liable to it.

(2) The legitimate birth-rate for 1911 arranged according to social classes is shown in the following table.—

Social Class		Rate per 1000 Males aged to years and over.	Rate per 1000 Married Males aged under 55 years
I. Upper and Middle Class	..	. 47	119
II. Intermediate Class	..	. 46	132
III. Skilled Workmen	.	.. 73	153
IV. Intermediate Class	.	.. 70	158
V. Unskilled Workmen	.	.. 90	213
VI. Textile Workers	..	.. 50	125
VII. Miners	..	.. 107	230
VIII. Agricultural Labourers	..	.. 49	161
III.-VIII. Working Class	..	.. 76	175
All Classes	..	.. 62	162

An interesting discussion of the significance of these figures is also included, but cannot be conveniently summarized here. The Registrar-General and Dr. Stevenson are to be congratulated on the production of a report which is of great interest and practical value. They have made a dreary wilderness of official figures to bear fruit in season if not to blossom.

EDGAR SCHUSTER.

PERIODICAL LITERATURE. ENGLISH.

THE SCIENTIFIC PROCEEDINGS OF THE ROYAL DUBLIN SOCIETY. Vol. xiv. (N. S.), No. 22. June, 1914. *Polygamous Mendelian Factors*. JAMES WILSON, M.A., B.Sc. Pp. 302-312. From a consideration of the behaviour of the coat colour of horses and cattle in inheritance the author draws the conclusion that each colour is produced by a single factor which may "mate" with the factor producing any other colour.

JOURNAL OF BIOLOGICAL CHEMISTRY. Vol. xvii. No. 2, March, 1914. *The Action of Various Anæsthetics in Suppressing Cell-division in Sea-urchin Eggs*, by Ralph S. Lillie. This is an interesting paper dealing with the inhibitory action of certain anaesthetics upon cell-division. It is suggested that the rhythmical process of cell-division, as well as the rhythmical contraction of heart muscle and cilia, depends upon some reversible change in the permeability of the cell-membrane to salt solutions, and consequently that neuro-muscular anaesthesia is caused by inhibiting these changes in the permeability of the membrane. It is concluded, since the concentration in a great number of anaesthetics investigated, required to arrest cell-division in the egg, is the same as that required to produce neuro-muscular anaesthesia in the larva, that both phenomena depend upon the same alteration in permeability.

H. O.

UNITED EMPIRE MAGAZINE, Vol. v., No. 8, August, 1914. *The Problem of Population*, by J. Saxon Mills. Pp. 648-654. The writer deals with the difficulty in retaining our Colonies when we can no longer supply emigrants in large numbers, and instances the fact that we contributed only one third while America and Continental Europe supplied two-thirds of the emigrants to Canada between 1900 and 1913. "A few more emigrants and a few babies less each year, and our population will be absolutely diminishing."

THE ENGLISHWOMAN, Vol. xxiii., No. 67, August, 1914. *The Un-married Mother in France*, by Mrs. Gertrude Austin. Pp. 138-151. This article describes the Asile Nuchalet in Paris, a municipal establishment for the shelter of pregnant women, which is run on admirably humane and scientific lines. There are also maternal canteens, and financial assistance is offered in cases of breast-fed babies and boarded-out children. Every effort is made to encourage mothers not to abandon illegitimate children to the Hospice des Enfants Assistés.

THE JOURNAL OF STATE MEDICINE, Vol. xxii., No. 8, August, 1914, has a note on the scheme to preserve infant life, recently brought forward by the Women's Co-operative Guild.

ARCHIVES OF NEUROLOGY AND PSYCHIATRY. Vol. vi. 1914. This periodical, published by the London County Council, contains an account of research work done in the pathological laboratory and asylums maintained by the Council. It is edited by Dr. F. W. Mott, the pathologist to the asylums, and the memoirs contained in it are based on work carried out either by himself or under his direction or at his suggestion. In the preface Dr. Mott reviews clearly and briefly the overwhelming evidence that general paralysis is caused by syphilis. More than fifteen per cent. of the male admissions to the asylums are general paralytics, and as the total cost of the asylums amounted in 1913 to £600,000, the expenditure of a considerable sum annually in the prevention of syphilis by the Council would be justifiable on purely commercial grounds.

The Nature of the Condition termed Parasyphilis, by F. W. Mott, M.D., F.R.S. Pp. 1-50. This paper is the report made to the neuro-

logical section of the International Medical Congress, modified in consequence of certain discoveries made public after it was originally written. There is a bibliography referring to works by more than fifty authors.

Statistics regarding General Paralysis in the London County Asylums, by F. W. Mott, M.D., F.R.S. Pp. 51-58. These statistics were prepared for the information of the Royal Commission on Venereal Diseases. As is mentioned above, more than fifteen per cent. of the male admissions to the asylums are general paralytics. The actual numbers for the quinquennial period 1908-1912 are: Total number of admissions—males, 9,087; females, 10,174. General paralytics—males, 1,469 = 16·1 per cent.; females, 268 = 2·6 per cent.

A Study of the Neuropathic Inheritance especially in Relation to Insanity. F. W. Mott, M.D., F.R.S. Pp. 79-98. In this address, which was delivered at the opening of the Henry Phipps' Psychiatric Clinic, Johns Hopkins University, Baltimore, U.S.A., Dr. Mott described his system of ascertaining and recording those inmates of the London County Asylums who have or have had relatives in the asylums; 3,485 cases of this kind are now on record. Among the problems discussed is that of "anticipation." By anticipation is meant that the insane offspring of insane parents become insane at considerably earlier ages than the average. Dr. Mott brings forward the following tabular comparison in support of the view that this occurs:—

Percentage comparison of the age at the time of onset of insanity in the insane offspring of insane parents, and the general admissions to the London County Asylums.

Age of Onset.	9579 direct admissions during last four years.	663 insane offspring of insane parents.
Under 25	20·1	44·0
25-34	19·9	27·9
35-44	21·7	15·5
45-54	18·2	8·5
55-64	12·7	3·2
65-74	5·8	·7
75	1·5	—

The differences are large enough to be a convincing proof of the theory of anticipation if there were not a possible source of error in the greater likelihood of insanity of the parents escaping detection in persons admitted to the asylums late in life than in those admitted early.

Another problem discussed is the origin of epilepsy and insanity in healthy stocks. Dr Mott, while recognising the difficulty of obtaining evidence conclusively demonstrating that alcohol and syphilis may, by poisoning the germplasm, give rise to these defects, brings forward pedigrees which tend to show that such poisoning does actually occur.

The Investigation of Twenty-Five Pedigrees of Insane Persons, by Dr. H. Wilson White. Pp. 99-126.

The Investigation of a Number of Family Histories of Patients in Cane Hill Asylum, by Dr. J. C. Wootton. Pp. 127-138.

Hereditary Resemblance in the Fissures of the Cerebral Hemispheres, by Dr. Edgar Schuster. Pp. 139-172. The interest of a study of this kind depends largely on the fact that the fissures indicate, in some cases at any rate, the boundaries of regions of the brain cortex differing from one another in structure and function. The extreme difficulty of obtaining brains of persons related to one another has prevented much attention from having been given to the subject. Material, more complete and satisfactory than any hitherto available, is being collected from the London County Asylums by Dr. Mott, and this forms the basis of the present paper, which is published as the first instalment of what may be an extensive study of the subject. The author first describes the most

important previous work on the subject, that of Karplus, and provides a rough statistical analysis of the data obtained by him. The results obtained amply prove the justice of his conclusion that "inheritance of the fissures of the brain does take place." Dr. Schuster next gives a detailed nomenclature of the fissures and gyri of the brain, based on the names used by Gustav Retzius and with respect to the occipital lobe by Elliot Smith. Two pairs of brains are next described in some detail, namely, those of a mother and daughter and those of two brothers. The points of similarity between the brains of the relatives in each pair are many and striking, they are pointed out in detail in the text and clearly shown in outline figures traced from photographs.

FOREIGN.

AMERICAN ANTHROPOLOGIST. Vol. xv. No. 4. October-December, 1913. *The Relative Time of Fertilization of the Ovum and the Sex-Ratio amongst Jews*, by Raymond Pearl and Redcliffe N. Salaman. Pp. 668-674. The authors conclude from a consideration of some statistics of Jewish families collected with particular care that "(a) there is no evidence that in the human race the time of fertilization of the egg relative to the catamenial period has any influence on the sex-ratio exhibited by the offspring. (b) The higher male sex-ratio shown by Jewish statistics, if not entirely due to faulty registration, must owe its origin to other factors than the time of fertilization of the egg."

BULLETIN OF THE AMERICAN ACADEMY OF MEDICINE. Vol. xv. No. 3, June, 1914. *Resumé and recommendations of the Committee to investigate teaching of Hygiene in Public Schools*. Pp. 121-126. This committee, appointed by the American Academy of Medicine, has done its work in a very thorough manner. They first analysed the laws requiring instruction in physiology and hygiene, then investigated the text books on the subject, and finally visited the schools in eighty Communities east of the Mississippi and north of Mason and Dixon's line. Reports have been published from time to time from 1904 onwards, of which a complete list is found in this article. Their recommendations cover hygiene in its widest sense, and it will be seen from the section quoted below that they advocate the teaching of eugenics although they do not mention the word. The passage runs (the committee recommend) "I. That from the Kindergarten up, by progressive steps, children be helped to learn through studies of plant and animal life the essentials of human physiologic processes, parenthood, heredity; the essentials of influence of environment in health and development, including micro-organisms, insects and other carriers of communicable diseases; that included in lists with typhoid, tuberculosis and other common contagions, syphilitic and gonococcus infection be enumerated, corresponding data being given for each in the list."

For this purpose it is urged that Fellows of the Academy concentrate individual influence on institutions training teachers and on boards licensing them, insisting that they be adequately prepared and tested in the elements of physical and chemical, biologic and social sciences with special reference to their practical applications in hygiene and sanitation.

BULLETIN OF THE AMERICAN ACADEMY OF MEDICINE, Vol. xv., No. 4, August, 1914. *The Relation of Modern Medicine to Some Social Problems*, by John L. Heffron, M.D. Pp. 185-193. The writer maintains that scientific investigation into the conditions which are hurtful to society and diminish human efficiency should be the duty of the medical world, medical men should co-operate with experts in the practical administration of protective and corrective measures. "What better statement of the natural way of advancing the study of every variation from accepted standards of life and of conduct can there be than the one pursued by physicians in the study of disease, viz., first, etiology; second, pathology; third, prognosis; fourth, prevention; fifth, treatment." The writer touches

on such subjects as mental deficiency, the teaching of sex hygiene, reform by education in the laws of heredity, racial poisons contributory to insanity, immorality and criminality, etc.

THE TRAINING SCHOOL BULLETIN. Vol. xi., No. 3. May, 1914. *A Study of the Intelligence of Delinquents and the Eugenic Significance of Mental Defect*, by Emile Renz. Pp. 37-39. Miss Renz has made a careful investigation of the intelligence of all girls admitted to the Girls' Reformatory of Ohio between January and July, 1912. The Courts may sentence to this institution "Girls from the ages of nine to seventeen, the prevalent charges being incorrigibility, disorderly conduct, larceny, street walking, immorality. All are subject to parole, on condition of improvement in character and conduct, but remain charges of the State till twenty-one years of age. The consideration is wholly one of moral failure. The assumption is that these girls are capable of normal conduct, and that, if they are carefully piloted over several years of life, their release will be warranted, and that a strict course of supervision will reform the offender. The commitment paper vouches for the mental normality of the delinquent." The girls who numbered 100 were graded according to the Binet-Simon scale. Six were equal to or in advance of age, two a year behind, eight from one to two years behind, five from two to three years, and seventy-seven more than three years. Making all possible allowances the author concludes that at least one-third of the whole number are of such mental deficiency as to warrant the special care of them as subnormal. Their school records appear amply to confirm the results of the tests.

THE JOURNAL OF HEREDITY. Vol. v., No. 6. June, 1914. *Eugenics Program in Utah*, by E. G. Titus. P. 248. Dr. Frank M. Briggs, Superintendent of the Utah School for the deaf and blind, was elected president of the Utah Eugenics Society at its annual meeting in Salt Lake City during April. Many papers were read at the meeting, and "the general trend of the discussions was all to the effect that we are not ready for many of the odd and peculiar Bills which have created enthusiasm in several of the States. That is, it is much better at the present time to devote our energies to education along eugenic lines, endeavouring to reach all the people possible and give them what we consider a proper idea of eugenics, to have all the lectures possible delivered before schools, church organisations and other general assemblies; to endeavour to secure co-operation of libraries in order that they may introduce books on eugenics to secure the co-operation of the various Women's Club, and, if possible, to secure at least one place on the program of each club for the coming year; to endeavour to secure better care and protection for the classes of people who are unable to care properly for themselves.

THE JOURNAL OF HEREDITY. Vol. v., No. 7. July, 1914. *Second Report of the Committee on Immigration of the Eugenics Section of the American Genetic Association*. Pp. 297-300. The committee urge the necessity of stringent immigration laws sternly enforced in view of such facts as the following: "It appears that while the foreign born in 1910 constituted 30·2 per cent. of the entire population of New York State, the foreign born insane constituted 43·4 per cent. of the patients in the State hospitals on September 30th, 1912." On February 4th, 1914, an Immigration Bill (H.R. 6060) passed the House of Representatives by a two-thirds majority. This Bill is recommended by the committee as embodying provisions which would result in the more effective detection, exclusion and deportation of mentally and physically defective aliens. It is on the same lines as a Bill which would have become law in 1913 but for the veto of President Taft.

Biological Eugenics. (Address delivered before the First National Conference for Race Betterment, Battle Creek, Mich., January 8th, 1914.)

Leon J. Cole. Pp. 305-312. A plea for eugenics expressed in very moderate terms. The author sums up his practical programme for racial betterment as follows: "Eugenic selection must, I believe, for a long time be confined to cases of marked defect and weakness. In addition more study must be given to those influences which may weaken the germplasm directly, such as alcohol. And medical science, rather than desisting, must push on, especially in the field of general prophylaxy, but with more thought to succeeding generations and the future of the race than it has given in the past. Philanthropy and charities cannot stop, but they must take more counsel of established sciences, and, like medicine, give more thought to the future."

Results of Early Marriage. Casper L. Redfield. Pp. 316-7. Eugenists sometimes advocate earlier marriages for the better members of the community that they may increase more rapidly. Mr. Redfield does not believe that early marriages lead to desirable results and offers a prize of 100 dollars to anyone who can show more than three cases in which "the intellectually superior person has as many as four generations in a century in the tail-male time alone." This is a sporting offer, but we cannot see that the result is likely to prove anything one way or the other.

THE JOURNAL OF HEREDITY, Vol. v., No. 8, August, 1914. *The Declining Birth-rate*, by F. H. Hankins. Pp. 361-367. This attacks the problem in America, and points out that though the better classes of the population marry earlier and more frequently than in the past, the number of births is decreasing. He considers the cause to be mainly psychological. Individual ambition being the central fact, the interests of the individual conflict with the interests of the race. No special solution of the problem is offered.

POPULAR SCIENCE MONTHLY. Vol. lxxxiv., No. 6. June, 1914. *Facts and Factors of Development*, by Prof. E. G. Conklin. Pp. 521-537. This is the first of the Norman Harris lectures for 1914 at North-Western University, on "Heredity and Environment in the Development of Men," to be published by the Princeton University Press. It contains a clear though very brief sketch account of fertilisation and the development of the embryo, which is admirably illustrated from the classical authorities on the subject.

POPULAR SCIENCE MONTHLY. Vol. lxxxv., No. 1. July, 1914. *Facts and Factors in Development. II., Development of the Mind*. Prof. E. G. Conklin. Pp. 21-39. The mind develops from simple beginnings contained in the germ, in the same way as the body does, and the elements in the mental processes of human beings have their parallels in the "minds" of lower organisms, as shown by their behaviour. The simplest of these elements which forms the basis of all psychic processes is sensitivity or the capacity of receiving and responding to stimuli, which is a fundamental property of all living matter. At a slightly higher stage one gets tropisms or reflexes, which, when they become complex, are called instincts. Memory also in its simplest form may be found in plants and lower animals, while the basis of intelligence and reason as shown by the adoption of methods of "trial and error" is present even in the protozoa.

POPULAR SCIENCE MONTHLY, Vol. lxxxv., No. 2, August, 1914, has two articles of special interest. *The Cellular Basis of Heredity and Development*, by Professor Edwin Grant Conklin, pp. 105-133, and *The Rôle of Sex in the Evolution of the Mind*, by Professor S. J. Holmes.

POPULAR SCIENCE MONTHLY, Vol. lxxxv., No. 3, September. Conclusion of Professor Conklin's article in the previous issue, pp. 232-246. *The Decreasing Population of France*, by Professor James W. Garner, pp. 247-259. The writer gives statistics of the birth and death-rates in

comparison with other countries. "The recent census statistics show a declining birth-rate in all the departments without exception. In many of them the rate of mortality exceeds the birth-rate by a third, while in some it is twice as great." After discussing numerous causes which have been suggested, Professor Garner considers that "the principal causes of the low birth-rate are not due to external conditions, social, legal or religious, but are the result of the general attitude of the French toward family life. The relatively high rate of mortality, inadequate hygienic conditions, alcoholism, divorce and other causes mentioned may be contributory factors, but the chief reason is that French people do not desire to have children. This attitude has been powerfully accentuated by neo-Malthusian propagandists. . . ." He concludes that "the true remedy lies not in legislative, administrative or fiscal measures, but in a reform of the morals and customs of the French people. There must be a fundamental change in the attitude of French men and women towards the obligation to rear families; there must be an awakening to the duty which devolves upon the citizen to contribute to the perpetuity of his race through the rearing of children to defend it in time of war or to pay taxes for the maintenance of the Government."

EUGÉNIQUE. 2e Année, No. 5. Mai, 1914. *Les lois de Naudin-Mendel dans L'Espèce Humaine, en particulier dans L'Albinisme Humain*, by Dr. E. Apert. Pp. 129-141. This paper is based on an analysis of the genealogies published in "A Monograph on Albinism in Man," by Pearson, Nettleship and Usher. The author argues that when two subjects who are not albinos have among their children one or more albinos, one can say that, if Mendel's law is correct (and if albinism is a recessive character), these two subjects are *heterozygotes DR*; and one knows that the proportion of *recessives RR* to be expected among the offspring of heterozygotes is 25 per cent. But if one judges the parents to be heterozygotes from the fact that they have albino children, then one should not get the theoretical 25 per cent. of albinos among their children, but a larger proportion; and this proportion will increase the smaller the size of the family is. If there is only one child in the family it must necessarily be an albino. In families of two, there is one chance in four that the first is albino and one chance in four that the second is an albino; consequently there is one chance in 16 that both are albinos. On the other hand there are three chances in four that the first is not an albino and three chances in four that the second is not an albino; therefore there are $3 \times 3 = 9$ chances in $4 \times 4 = 16$ that neither child will be an albino, but these will escape attention because we can only deal with families in which one child at least is known to be an albino. Thus one should expect to find among families of two one family with both children albinos to six with one child an albino; in other words, eight children in 14 or 57 per cent. will be albinos. In the following table are shown, first the percentage of albinos to be expected in families of different sizes calculated in the manner indicated above, and next the percentage actually found in the published genealogies. Below this again is given the number of families of each size.

No. of children in family.	1	2	3	4	5	6	7	8	9	10	11	12	13
Percentage of albinos calculated.	100	57	43	36	33	30	29	28	27	26	26	26	25
Percentage of albinos observed.	100	68	51	40	36	35	32	31	25	26	29	25	26
No. of families ...	64	80	96	85	77	74	57	40	34	29	15	11	7

It will be seen that there is a general agreement between the observed numbers and the calculated numbers, except that in the smaller families the former are higher than the latter. This divergence is probably due to the fact that families containing more than one albino are more likely to attract attention and to be recorded than those containing only one. After testing the figures by considering the distribution of albinos in families of particular sizes Dr. Apert remarks that it is difficult to avoid the conclusion that human albinism is a recessive character obeying Mendel's law.

JOURNAL OF GENETICS. Vol. iii., No. 4. April, 1914. *The Relative Lengths of the First and Second Toes of the Human Foot*, by Mrs. Merritt Hawkes, is the paper of chief interest to students of eugenics. She shows that there are three main types of foot; (*a*) in which the big toe projects well beyond all the others, (*b*) in which the second toe projects beyond the first, and (*c*) in which the first and second are of equal length. Of these types the first is much the commonest (89 per cent. of men, 82 per cent. of women), the second is comparatively rare (commoner in women), and the third very rare. Most commonly both feet are of the same type, but in over 5 per cent. of the cases examined one belonged to the "long," the other to the "short" type. Details are given of the anatomical relations of the types, and a considerable part of the paper is devoted to a discussion of their inheritance. Mrs. Hawkes concludes that the long type of great toe is in general dominant over the short type, and that the cases of dissimilar feet are heterozygous, but it must be confessed that the data given do not seem in accord with any such simple hypothesis.

Hybrids Between Moths of the Subfamily Bistoninae, by Messrs. Harrison and Doncaster, describes cases in which reciprocal crosses between two species give only males in one cross and both females and males in the converse. One of these species was found to have four times as many chromosomes as the other, and in the spermatogenesis of the hybrid hardly any pairing of chromosomes took place.

The Transmission of Secondary Sexual Characters in Pheasants, by Mrs. Haig Thomas, gives detailed descriptions of the results of crossing the Swinhoe male with the Silver female, and repeatedly back-crossing the offspring with Silver females. The results suggest that the Silver female is unable to transmit all its typical characters to its female offspring.

Heredity of Melanism in Lepidoptera, by Mr. W. Bowater. The author shows from his own experiments that in one species the melanic form is a simple Mendelian dominant, and gives a valuable summary of the known facts in many other species, in most of which the same conclusion may be drawn.

JOURNAL OF GENETICS. Vol. iv., No. 1. June, 1914. *Hereditary Left-handedness*, by Prof. H. E. Jordan. The pedigrees leave no doubt of the hereditary nature of the condition, and some of them strongly support the conclusion that it is a Mendelian recessive, but in view of the exceptions recorded, and the several pedigrees in which it might be dominant, it seems probable that the dominance of right-handedness is somewhat irregular.

Note on Twinning, by Prof. Jordan, calls attention to the inheritance of twin-production in man, and shows that the evidence indicates that the production of twins may be influenced by the male parent, perhaps by giving the fertilised ovum a tendency to divide. Other papers are:

Inheritance of Weight in Poultry, by Prof. Punnett and P. G. Bailey, in which they conclude that weight depends on the cumulative action of several independent Mendelian factors.

Immunity to Fungous Diseases as a Physiological Test in Genetics and Systematics, as Exemplified in Cereals, by N. I. Vaviloff.

The Relations Between Chromosomes, Sex-limited Transmission and Sex-determination in Abraxas Grossulariata, by L. Doncaster, which describes the first known case of an impaired heterochromosome in the female.

A Peculiar Negative Correlation in Oenothera Hybrids, by G. H. Shull. In this last paper the author describes reciprocal crosses between *Oe. rubricalyx* (Gates) and other forms, and points out that in the F₁ hybrids the red buds of *rubricalyx* are always associated with green stems, but green or pale buds with red stems. He maintains that in almost all cases the genetic behaviour of *Oenothera* appears to be inconsistent with a Mendelian explanation, and severely criticises those writers (e.g. Gates and Heribert-Nilsson) who have attempted to show that the many puzzles presented by *Oenothera* are all susceptible of simple Mendelian solutions.

L. DONCASTER.

ARCHIV FUER FRAUENKUNDE UND EUGENIK. Edited by Dr. Max Hirsch. I Band. I. Heft. March, 1914. *Ueber Ziel und Wege frauendlicher Forschung*. Pp. 1-20. The introductory article by the editor gives the aim of this new scientific journal. It is intended to bring together the various branches of knowledge relating to womanhood, to co-ordinate all that is known about woman in medicine, hygiene, psychology, sociology, etc., etc., and thus pave the way for a complete "Science of Womanhood." As the problem of woman is closely bound up with that of the future generation, eugenics forms an integral part of any such science.

Die Statistik der Fehlgeburten. Dr. F. Prinzing. Pp. 22-33. A useful compilation of statistics of miscarriages as far as known. Miscarriages occur in about ten per cent. of all conceptions, rising very much in certain trades, as rubber, lead industries, etc. They rise with the number of conceptions, and are more frequent in conceptions out of wedlock. The male sex predominates over the female, the proportion being 160 males to 100 females. Miscarriages are much more frequent among the working-class than among the well-to-do. There seems to be a general concensus of opinion that criminal abortion has been on the increase of late.

Die Theaterprostitution in Wandel der Zeiten. Dr. Heinrich Stümcke. Pp. 33-55. A historical sketch showing the close connection between prostitution and the theatre throughout the ages.

Die Frage nach dem gunstigsten Heiratsalter. Pp. 57-62. Discusses various estimates of the "Most Favourable Marriage Age of Women," finds as the conclusion that the twenty-first and twenty-second years are the best.

Über die Sitten Polizei. Dr. Werthauer. Pp. 163-170. The author advocates the abolition of direct police interference in matters of prostitution, and gives various social remedies which are to take its place.

S. H.

ARCHIV FUER FRAUENKUNDE UND EUGENIK I Band, II Heft, May, 1914. *Sittlichkeitsverbiechen von Frauen und an Frauen*. Dr. M. H. Goring. Pp. 121-129. Gives a review of the various paragraphs of the German Penal Code relating to sexual crime.

Die Hochzüchtung des Menschengeschlechts. Dr. Franz Schacht. Pp. 131-139. An argument against active eugenic interference with marriage at the present day. The first object of eugenics can only be to select reliable statistics, for the present, with reference to the transmission of inferior qualities from good stocks, and vice-versa. Legislative interference with marriage at the present time would, according to the author, only increase illegitimacy and concubinage.

DIE NEUE GENERATION. 10 Jahrgang, 5 Heft, May, 1914. *Rassenmischung und Mischehenfrage*. Ferd. Frhr. v. Reitzenstein. Deals with the problem of miscegenation of white and coloured races as affecting the problem of colonisation. The author shows that unfavourable results are due not so much to race-inheritance as to adverse environmental conditions under which half-castes are generally reared.

Von Liebe und Liebesfreundschaft, by Grete Meisel-Hess. A plea for freer relationship between man and woman advocating the right of "erotic friendship" when and where the "one great eternal love" is unattainable. The article, being short, hardly does justice to the tremendous social implications involved in such revolutionary proposal.

DIE NEUE GENERATION. 10 Jahrgang, 6 Heft, June, 1914. *Rassenmischung und Mischehenfrage*. Ferd. Frhr. v. Reitzenstein (conclusion). As Europeans (the article refers especially to Germans) are generally incapable of permanent acclimatisation in hot climates, while the hybrid coloured offspring are on the whole not undesirable stocks, the author advocates the encouragement of an indigenous coloured population as a means of colonisation.

Daemmerschlaf, by Mary Summer-Boyd. A description of the painless method of confinement by means of scopolamin-morphium injections as practised at Professor Kroenig's Frauenklinik in Freiburg in Br.

S. H.

LA REVUE PSYCHOLOGIQUE, VI., 4, December, 1913. *Sur les Rapports entre l'Acuité Sensorielle et l'Intelligence*. Mme. Marie Lipska-Librach. Pp. 425-501. This, the concluding portion of Mme. Lipska-Librach's doctoral thesis, contains the chapters dealing with *La Sensibilité à la Douleur*, *Acuité Visuelle*, *Acuité Auditiva*, *La Force Musculaire*, and *Conclusions Générales*. Her experiments were carried out upon 420 children in Brussels. The children were divided into three groups according to their age, namely, nine, ten, and eleven years respectively; and each group was again subdivided into two or three sub-groups of fifty or sixty children according to intelligence. She gives average measurements for the various groups and sub-groups. On the basis of her results she concludes that in tactile, visual, and auditory acuity, in sensibility to pain, and in muscular force children of superior intelligence are throughout superior to those of poorer intelligence. The difference is most marked and most constant in the cases of sensibility to touch and to pain and of muscular force. In the case of visual and auditory acuity, the more intelligent children show a greater delicacy at the younger ages; but at older ages they become equal or even inferior. At first sight, these results appear to contradict the conclusions of other observers, and to suggest, as the writer herself remarks, that the cutaneous senses and muscular development are of greater importance for intellectual development than hearing or vision. This inference, however, she disavows. As carried out in these experiments, the process of tactile discrimination was something much more complex than a mere exercise of sensorial acuity. The author herself emphasises in this relation that the aesthesiometric tests required an effort of judgment and of sustained voluntary attention to a far higher degree than the tests for vision or hearing. The tests for pain she considers to have been equally complex. But here the comparative obtuseness of the older and more intelligent children is to be ascribed to their greater control of imagination and fear—both aroused by this test—rather than to their superiority of judgment and attention. Voluntary effort also intervened in the test for muscular force. On the other hand, pathological conditions are more common in children in the case of eyes or ears than in the case of skin or muscles. Children are more liable to be deaf or shortsighted than paralysed or anaesthetic. The frequency of visual and auditory defects increases with age; and the frequency of shortsightedness is greater among the cleverer children. Mme. Lipska-Librach's conclusion thus represents a very complex fact.

It is quite possible that, if she had eliminated the influence of disease from her measurements of sight and hearing, and if she had eliminated (as far as such factors can be eliminated) the influence of intellectual, emotional, and volitional factors from the tests of tactile discrimination, pain, and muscular force, her conclusions would then have been in harmony with that of others. In her final discussion she endeavours to make theoretical allowance for these irrelevant influences; and it appears that she would expect to find that, when this had been done, the highest correlations would be found in the case of the highest senses. If so, this would be in accord with the results of other investigators. That the relations between sensory acuity and intelligence are closest in younger children, that their intelligence is therefore sensorial, and that delicacy of sense-perception is in consequence of great importance for their early intellectual development—these further inferences are of considerable value and interest. It is unfortunate, however, that the writer's statistics should stop short at the calculation of averages and their differences.

QUARTERLY CHRONICLE.

CENTRAL SOCIETY.

COMMITTEES.

July 6th.—First Meeting of the Local Administration Enquiry Committee.

,, 16th.—Finance Committee Meeting

,, 17th.—General Council Meeting.

Sept. 15th.—Special General Council Meeting.

MEETINGS.

July 9th.—Major Darwin before the Junior Constitutional Club on "The Influence of Eugenics on Legislation."

July 28th.—Miss N. March before the Ivy Leaves Girls' Club, Stepney, on "Eugenics."

Mr. C. S. Stock, before the Wealdstone Men's Adult School, gave two lectures on "Eugenics" on September 13th and 20th

SUMMER SCHOOLS.

At the Oxford Summer School Dr. Schuster gave two lectures on "Eugenics" on July 23rd and August 5th.

WELLINGTON BRANCH - NEW ZEALAND.

President—Professor H. B. Kirk.

Vice-Presidents—Dr. J. B. Mason, Dr. F. Hay, Mrs. A. R. Atkinson.

Hon. Auditor—J. S. Barton, Esq.

Hon. Secretary—Miss England

Council—T. King, Esq., Dr. Hardwick Smith, A. H. Hindmarsh, Esq., Sir Robert Stout, A. Hamilton, Esq., F. G. A. Stuckey, Esq., Sir John Findlay, E. J. Kennedy, Esq., C. B. Morison, Esq., F. W. Franklin, Esq., D. McLaren, Esq., J. S. Tennant, Esq., Dr Platts-Mills, Rev. W. Jellie, Miss P. Myers.

THIRD ANNUAL REPORT.¹

1913-1914.

The work of the past year does not afford much material for comment. Owing to various causes there was no opportunity for any new departure and the work undertaken had to be confined to the always valuable, but not in any way sensational, monthly lectures given at the Society's regular meetings.

¹ N.B.—Owing to late arrival it was not possible to include it in the Sixth Annual Report of the Society.

The lectures given during the winter of 1913 were, however, some of the best of those arranged for by the Council since the formation of the Wellington Society. In June Mr. Pope lectured on "The Work of the Industrial Schools of the Dominion"; in August Mr. Hogben, Inspector-General of Schools, explained with great wealth of detail the results arrived at by the Medical Inspector of Schools in New Zealand; in September Miss P. Myers based an admirable lecture on the facts dealt with in Dr. Russell Wallace's book, "Social Environment and Moral Progress." All these papers provided useful discussion and were much appreciated by those who heard them.

One public lecture was also arranged by the Society and was given on July 7th by Professor Pickerill, of Otago University, at that time in Wellington as a delegate to the Dental Conference. This lecture, which was the result of much original and valuable research by the Professor, whose services to dental science are well known to the dentists of the world, was illustrated by lantern slides made on purpose and aroused much interest and many pertinent questions from the audience.

In addition, papers have been read to various country societies by Miss P. Myers, Mr. G. Nicholas, and other members of the Society, and literature has been supplied for distribution. Requests for information as to the formation of branch societies have been received from Brisbane and Melbourne and information has been received that a society is being formed in the former town.

At the Australasian Medical Conference held in Auckland, the Society was represented by Dr. Hay, but it was not found possible to hold a special eugenics meeting, as the programme was over full and the time limited.

A former member, Rev. W. Jellie, resigned upon leaving the Dominion to take up work in England, but has kindly agreed to act as the Society's representative in the matter of keeping touch with the parent Society. His keen interest in the movement will enable him to render good service to the Society in this respect.

The Society has suffered a most serious loss by the death of Mr. A. Hamilton, late director of the Dominion Museum, and a member of the Council of this Society. Mr. Hamilton was a man whose eminent sanity of view and far-reaching and exact knowledge of biological science gave a peculiar value to his advocacy of eugenics. For this reason, and for his constant and kindly helpfulness, his death is keenly felt and deeply deplored by the Society.

Arrangements have now been made with the London office to supply the EUGENICS REVIEW direct to all members each quarter. It is hoped that this will ensure its regular delivery and be in every way more satisfactory than the former arrangement.

The conditions of membership of the Wellington Branch of the Eugenics Education Society are as follows:—Subscriptions for full members (alone eligible for a seat on the Council), 10s. 6d. per annum, including the EUGENICS REVIEW post free. Associates, 5s. Yearly subscription to the EUGENICS REVIEW, 5s. 6d., post free.

CHRISTCHURCH BRANCH—NEW ZEALAND.

Lectures. The Hon. Secretary, Mr. W. H. Symes, lectured on "The Feeble-Minded" at a meeting of the Society, and on "Heredity" before the Medical Society; in addition he has spoken at four small meetings at private houses. Professor McMillan Brown has addressed various public bodies and thereby given moral support to the cause of eugenics.

Legislation. No eugenic Act has been passed since the Mental Defectives Act of 1911. A few persons have been dealt with under this Act, and many more would have been, but that no place has yet been provided for receiving adults. There is a home and school for defective

boys, accommodating about 60, but room is wanted for three or four hundred. A small home and school for defective girls is now being built.

The asylums are overcrowded and the demand for accommodation increases every year. Home for epileptics and a home for alcoholics are badly needed, although the latter is to some extent provided by the Salvation Army. A start has been made this year with the medical inspection of schools. It is too soon for any detailed reports of the results to be available, but from the partial reports which have appeared in the newspapers, it appears that many serious defects are prevalent, although the proportion is perhaps not so great as in England. The Australasian Medical Congress at Auckland memorialised the Government to provide increased facilities for the free treatment of venereal disease. Owing to the efforts of Dr. Fenwick, the Christchurch Hospital is the first in New Zealand to carry the recommendation into effect.

The Society are trying to promote preference of employment to married men. It is badly needed because nearly all sheepfarmers, *i.e.*, runholders, invariably give preference to unmarried shepherds.

W. H. SYMES, Vice-President and Hon. Secretary.

Lectures for Eugenists at the Imperial College of Science and Technology, South Kensington.—Professor MacBride will deliver a course of sixteen weekly lectures entitled "An Introduction to the Study of Heredity," commencing in January, 1915. This course was to have been given by the lecturer in zoology, Mr. H. M. Fuchs, but owing to the war he will not be available, so Professor MacBride has very kindly undertaken to give the lectures himself. The exact syllabus is not yet available, but the outline of its contents, which is appended, shows the subjects to be dealt with. Members of the Society wishing to attend this course should apply to the Hon. Sec., Eugenics Education Society, Kingsway House, Kingsway, W.C.

OUTLINE SYLLABUS.

Introductory. The organism, growth and reproduction; the idea of evolution.

Variation. The exact study of variability.

Statistical investigation of heredity. Methods and results.

Analysis of heredity by hybridisation. Mendel's experiments and his interpretation of them.

More complex cases of Mendelian inheritance; extensions of the theory.

Heredity of sex. Mendelian interpretation; cytological evidence; sex-determination.

Causes of new inheritable variations. Experimentally produced mutations. The question of the inheritance of acquired characters.

Theories as to the origin of new races.

Examples of inheritance in man.

Lectures at the Galton Laboratory.—A course of lectures introductory to the science of eugenics will be given in the department of applied statistics and eugenics during the session 1914. In the first term eight lectures on the biological basis of heredity will be delivered by Dr. O'Donoghue on Fridays at 6 p.m., beginning October 16th. In the second and third terms Prof. Karl Pearson will deal respectively with the statistical basis of eugenic theory and the facts and theories of heredity. A fee of £1 1s. is charged for the whole course, or 10s. 6d. for each term, teachers being permitted to attend the whole course for a fee of 10s. 6d. In addition Dr. David Heron will deliver ten lectures on elementary statistical methods on Tuesdays at 6 p.m., beginning October 13th. These are arranged for the benefit of teachers, and are intended to illustrate methods useful in interpreting data in the reports of school medical officers and in the reduction of material which can be obtained from observations on school children by the teachers themselves. The

lectures will be followed by practical classes, in which the students will apply to actual data the methods explained in the lectures.

Eugenics and Social Work.—Owing to the war the course of lectures under the above title to be given during the autumn by Bishop Welldon, Mrs. Clare Goslett, and Mr. Dixon Kingham has been postponed. It is recognised that the social workers for whom the lectures were arranged are now overwhelmed with urgent calls on their time. The same course was to have been given in Birmingham and is also postponed.

The Dutch Committee for Medical Examination before Marriage is doing most useful work in the establishment of consultative medical bureaux, at which people who desire to marry and wish to ascertain whether there is any hygienic reason why they should not do so, can obtain medical advice without payment. Many public-spirited physicians have come to the assistance of the committee by offering their services gratuitously, and it appears that eight bureaux are now at work. The object of the committee is to prevent the marriage of persons suffering from venereal disease and the infection of innocent people and the waste of and damage to infant lives which it entails. The Dutch Committee has its headquarters at The Hague, but the British Vice-Consul at Rotterdam has kindly informed us, in answer to our inquiry, that other societies with similar objects are being formed at Naerden, at Amsterdam, and at Utrecht.

The American Eugenics Committee.—To aid in guiding public interest in eugenics along scientific lines, and to increase this interest by propaganda, the President of the American Genetic Association has appointed the following as members of the Committee on Education and Extension which was created by the council of this association last winter :

David Starr Jordan, Chancellor of Leland Stanford Junior University, California (chairman).

Dr. Rupert Blue, Surgeon, U. S. Public Health Service, Washington, D. C. (first vice-chairman).

Mrs. John Hays Hammond, former National Chairman, Women's Welfare Department, National Civic Federation, New York, N. Y. (second vice-chairman).

Dr. W. C. Rucker, Assistant Surgeon General, U. S. Public Health Service, Washington, D. C. (secretary).

Irving Fisher, Professor of Political Economy, Yale University, New Haven, Conn.

Dr. Elnora Cuddiback Folkmar, Superintendent of Women's Auxiliary Clinic, Washington, D. C.

Mrs. Charles Cary Rumsey, New York, N. Y.

The Very Reverend Walter Taylor Sumner, Dean of the Cathedral of St. Peter and St. Paul, Chicago, Ill.

Talcott Williams, Dean of the School of Journalism, Columbia University, New York, N. Y.

Mrs. Huntingdon Wilson, Washington, D. C.

The letter of invitation sent to those selected as members (all of whom have accepted) states that "The object of this committee will be to promote the education of public sentiment throughout the country, in order that a 'eugenic conscience' may be formed in as many individuals as possible; to oppose premature legislation and, if necessary, to suggest desirable legislation, on the basis of scientific data. The work of this committee will be focused in the organ of the association, *The Journal of Heredity*."

The committee expects to adopt every means possible to further the interests of conservative and constructive eugenics, but its principal work, for some time at least, will probably be the formation of local societies

for the study of the subject, the arrangement of public meetings and lectures by men of science, and the publication of results of research which have direct application to the problems of human heredity. The committee will in this way supplement the Committee on Research in Eugenics of the American Genetic Association, and will also, it is hoped, occupy a new field, which has hitherto been left practically unoccupied, but in which there is the possibility of doing a great deal of useful work.

The Wages of Married Employees in German Towns.—In several German towns the married workmen employed by the municipality receive additions to their wages which vary with the size of their families. Through the courtesy of the burgermeisters of Mainz, Strassburg and Ulm, we are able to give the details of the regulations in force in these cities. In Mainz married workmen with two children or less under the age of 16 receive 1·50 mk. a week additional wages; where the number of children of this age is three or four the amount rises to 1·75 mk., and if there are more than four to 2 mk. Single workmen without dependants receive an addition to the standard wages of 0·75 mk., but where they have to maintain their parents they rank as married workmen without children. In Strassburg married workmen receive an addition of 5 per cent., which is increased to 15 per cent., 20 per cent., and 25 per cent. as their families increase to more than three, more than five, and more than seven children under 16 years of age. In Ulm, since 1912, all married or widowed workmen with two children, whose yearly wage is less than 1,800 mk., receive a monthly addition to their wages of 4 mk., which is increased by one mark for every additional child.

Eugenie Problems discussed at a prominent political meeting in Norway.—At a meeting in Christiania, where political delegates of the "Radicals"—at present the ruling party in Norway—met to discuss new lines in politics, Dr. Alfred Mjøen gave a lecture on eugenic problems and outlined his policy of social reform. There were present several Members of Parliament, the Minister of Justice, the Minister of Foreign Affairs, the Minister of Finance, and Ministers of other departments, and the Prime Minister of Norway, Gunnar Knudsen, who conducted the meeting. Dr. Alfred Mjøen's programme for social and eugenic reform is known from the meeting of the Permanent International Eugenics Committee and from his earlier lectures in Norway, Denmark and London. He sketched out his programme and gave further an account of eugenic work in England, Germany and America. Great interest was aroused by the speech of the Minister of Justice, Abrahamsen. On many points he expressed views on eugenics similar to those advocated by Dr. Mjøen, and further he expressed his intention that in the new revision of the criminal law he would, without doubt, take some of these even more radical reforms into consideration. The Prime Minister of Norway concluded by saying that the eugenic ideas deserved the serious attention of practical politicians.

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- Social Chaos and the Way Out*, by ALFRED BAKER READ. (Publishers: Hendersons, London, 1914. Price 7s. 6d. Pp. 304.) If this book is a joke it is in bad taste. The author's "way out" of social chaos would lead either to the extinction of society or of civilisation. The "way out" may be indicated by a quotation from the contents—"Children are not wanted," "How infanticide will gradually become a custom," "Willing pioneers," "No other means of settling labour disputes."
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THE EUGENICS REVIEW

EUGENICS AND THE WAR.¹

By THEODORE G. CHAMBERS.

THE subject of war, in its biological, sociological and ethical aspects, has been discussed by many men through many years, and the conclusions at which they have arrived merely confirm the proverb "Tot homines tot sententiae." Let us consider, in the first place, the relationship between Eugenics and War, and determine whether, and to what extent, the subject may be a legitimate field for discussion by this Society. The science of eugenics is defined by a few words quoted from Galton, which are so wisely reprinted on the title page of every number of The Eugenics Review. "Eugenics is the study of agencies under social control that may improve or impair the racial qualities of future generations, either physically or mentally."

The extent to which, in our own age, the condition of war can be said to be under social control is a question for argument. It may be that war partakes rather of the nature of a natural catastrophe or cataclysm than a conscious determined act. The larger the social groups and the more complex the social organisms which find themselves in a condition of war, the more do we seem to see the hand of fate and the inevitability of the conflict. We seem to see the gradual accumulation of antagonisms, the slow growth of incompatible ideals, a progressive difference of purpose foreshadowing only one conceivable end—trial by battle. So vast and varied are the forces, so indeterminate their origin, and so complex the organisms in which they develop, that it is impossible to define first causes

¹ N.B.—A lecture delivered on October 8th, 1914, before the Eugenics Education Society, at the Grafton Galleries, London.

or to locate responsibilities. All that can be said with certainty is that man, with his inherited instincts, and his acquired characteristics, is the medium through which the forces operate which produce war and that it is upon the race in the aggregate that the burden falls. War may be inevitable, but the fact remains that we can control the methods by which we prepare for and conduct it; and thus far we can influence in no small degree the effect it may have upon the racial qualities of future generations.

War has been an ever-recurring phenomena from the beginning. Since life was, the condition of war has never been long absent. War appeals to the most deep-rooted instincts. It appeals to the highest as well as to the lowest instincts of man. As McDougall says, "The instinct of pugnacity has played a part second to none in the evolution of social organisation. It has been operative in the emotion of revenge and in the moral indignation which have led to the growth and maintenance of every system of criminal law and every code of punishment. In the present age it operates more powerfully than any instinct in producing demonstrations of collective emotion and action on a great scale. The races of men certainly differ greatly in respect to the innate strength of this instinct; but there is no reason to think that it has grown weaker among ourselves under centuries of civilisation; rather it is probable that it is stronger in the European peoples than it was in primitive man." Every war is the result of this collective pugnacity. The widespread feeling of pleasure in war comes from the gratification of this natural instinct.

The stern joy which warriors feel,
In foemen worthy of their steel.

says Scott. The same instinctive delight in war is expressed in one of Stephen Graham's recent letters from the East. He reports a conversation with a young Russian officer. "There is a certain beauty in war, in going to death with songs," said Graham to the officer. The reply was, "I would even say there is no greater beauty." The joy of war is still, as it always has been, a constant theme with those to whose deep-rooted instincts it appeals. Even the most sober-minded appear to be

caught by the martial spirit and to find in war something which appeals intensely to their instincts. The late Professor Cramb, in his lectures on "Germany and England," says, "And if the dire event of a war with Germany—if it is a dire event—should ever occur, there shall be seen upon this earth of ours a conflict which, beyond all others, will recall that description of the great Greek wars :

Heroes in battle with heroes,
And above them the wrathful gods.

And one can imagine the ancient mighty deity of all the Teutonic kindred, throned above the clouds, looking serenely down upon that conflict, upon his favourite children, the English and the Germans, locked in a death struggle, smiling upon the heroism of that struggle, the heroism of the children of Odin, the war god."

Language such as this would indicate an atmosphere in which the war spirit must thrive and flourish. But though the mere notion of war appeals, it is in the actual environment of war, when excitement reigns supreme, that the most unexpected deep-seated instincts receive a stimulus. Lust, cruelty, and blood-thirstiness on the one hand; sympathy, courage and affection on the other, seem to be intensified. War brings out into bold relief the intensest emotions of good and evil. War tears off the decent garments of custom and leaves the soul naked. There is no greater revealer of the heart of man.

It is to these primitive, uncontrolled instincts of man that the apologist for war almost invariably appeals. Nietzsche, in a note on the indispensable nature of war, says, "It is nothing but fanaticism and beautiful soulism to expect very much (or even much only) from humanity when it has forgotten how to wage war. For the present, we know of no other means whereby the rough energy of the camp, the deep impersonal hatred, the cold-bloodedness of murder with a good conscience, the general ardour of the system in the destruction of the enemy, the proud indifference to great losses, to one's own existence and that of one's friends, can be as forcibly and certainly communicated to enervated nations as is done in every great war." The argument appears to be that war gives man something which

peace cannot give, and that the natural instincts must be satisfied regardless of the ethical factor and of the consequences to others. The satisfaction of the natural instincts by more civilised methods and in a manner less injurious to others is not considered by Nietzsche to be adequate. He says, "The English of to-day, who appear on the whole to have also renounced war, adopt other means, in order to generate anew those vanishing forces, namely, the dangerous exploring expeditions, sea voyages and mountaineerings, nominally undertaken for scientific purposes, but in reality to bring home surplus strength from adventures and dangers of all kinds." We may doubt whether the English have any such conscious purpose in their excursions to the poles, their voyages and their mountain ascents, their wild game expeditions and their explorations. But these ventures undoubtedly provide the stimulus for the instinct of pugnacity, and while giving intense satisfaction to the individual, are comparatively innocuous to others.

McDougall shows that the instinct of emulation tends to replace the instinct of pugnacity, but that, as regards nations, it will be a long time before the change will eliminate international war. He shows that individual pugnacity has already to a large extent been checked. Within highly organised communities, individual combat, and even expressions of personal anger, may be almost completely suppressed. "At the present time," he says, "custom is only just beginning to exert some control over international pugnacity and we are still very far from the time when international law, following in the wake of custom, will render the pugnacity of nations as needless as that of the individuals of highly civilised states, and physical combats between them as relatively infrequent." At the same time he sounds a note of warning when he says that this tendency will bring to an end what has been an important, probably the most important, factor of progressive evolution of human nature, namely, the selection of the fit and the extermination of the less fit (among both individuals and societies) resulting from their conflicts with one another. (He suggests that it is to this tendency that the attempt to form a science of eugenics owes its importance.)

Spencer, in his "Data of Ethics," ventures to prophesy a cessation of war. In his dissertation on the apparently permanent opposition between egoism and altruism, he says, "If the idea of all was the securing of others' pleasure, obviously war would cease. Far off as seems such a state, yet every one of the factors counted on to produce it may already be traced in operation amongst those of highest natures. What now in them is occasional and feeble, may be expected with further evolution to become habitual and strong; and what now characterises the exceptionally high may be expected eventually to characterise all. For that which the best human nature is capable of is within the reach of human nature at large." Spencer appears to have realised that, at least in 1879, such views would not gain general acceptance. He says, "That these conclusions will meet with any considerable acceptance is improbable. Neither with current ideas, nor with current sentiments, are they sufficiently congruous." But he ventures to suggest that "Some may not think it absurd to believe that a rationalised version of its ethical principles will eventually be acted upon."

The school of militarists, while admitting the tendency towards at least a desire for peace, view the prospect with much concern, and honestly believe it to be disastrous to the moral and physical development of the race. Bernhardi says, "Our people must learn to see that the maintenance of peace never can or may be the goal of a policy. The inevitableness, the idealism and the blessing of war, as an indispensable and stimulating law of development, must be repeatedly emphasised." "Nevertheless," he continues with a note of regret, "long periods of war, far from convincing men of the necessity of war, have, on the contrary, always revived the wish to exclude war, where possible, from the political intercourse of nations." Treitschke is particularly scornful towards the pacifist views. "It has always been," he says, "the weary, spiritless and exhausted ages which have played with the dream of perpetual peace." The view that what has been and is must therefore be right, and that any betterment is but the dream of fanatics, is held by very many. "Wars are terrible," says Hegel, "but necessary,

for they save the state from social petrifaction and stagnation. It is well that the transitoriness of the goods of this world is not only preached, but is learned by experience. War alone teaches this lesson."

It is not necessary to make further quotations to indicate the general trend of the arguments of this type. For the militarist point of view, we might quote profusely from both German and Anglo-Saxon writers. Mahan, Lea and Roosevelt in America, equally with Moltke, Treitschke and Bernhardi in Germany, voice the belief in the efficiency of war as a beneficial social agency. Even the pacifist school admits that in the past at least war may have played a part, and a necessary part, in the evolution of the race, and there are few who do not recognise that in our present stage of development, whatever may be the case in the future, war may be justifiable, and is still inevitable.

While we may foreshadow the eventual abandonment of war by man, though we may prophesy that the day may come when war between nations will be as rare as duelling is in England to-day, it must be evident to the practical mind that such a day is still far away. It must be generally admitted that the human race is still too little advanced for us to expect a cessation of war in the near future. War is still necessary, still justifiable in given conditions. Even Spencer changed his view of militancy considerably. From the doctrine: never fight unless actually attacked, he came to admit the necessity and rightfulness of militancy from the point of view of relative, though not of absolute ethics. We can agree with Bernhardi when he says "The individual can perform no nobler moral action than to pledge his life on his convictions, and to devote his own existence to the cause which he serves, or even to the conception of the value of ideals as to personal morality. Similarly, nations and states can achieve no loftier consummation than to stake their whole power on upholding their independence, their honour and their reputation." We do not think there is a living man in whose breast there is no response to Addison's words in Cato :

My voice is still for war!
Gods! Can a Roman senate long debate
Which of the two to choose, slavery or death!

Whatever horror we may feel when we think of war, however much we may recoil from it, we have to realise that the world has not yet reached a stage of development in which it can be dispensed with. We must all agree with the sentiment expressed in Van Dyke's words on the statute of General Sherman :

This is the soldier brave enough to tell
The glory-dazzled world that "war is hell."
Lover of peace, he looks beyond the strife,
And rides through hell to save his country's life.

The inevitability of war and justification for war in the era in which we ourselves live is amply proved by the circumstances of the present war. England declared war upon Germany on the 4th of August last owing to the summary rejection by the German Government of our request that she should respect the neutrality of Belgium, in accordance with a treaty to which she, with ourselves and France, had been parties. Here was a question of national good faith involving the existence of our national honour. It was utterly impossible to stand by and see a small nation crushed out of existence in defiance of international pledges, in order to satisfy the lust of power of one European State. Here was a case where no man of honour or of spirit, no man who cherished any ideal worthy of the name, could fail to advocate war. No Government could have retained office for a single day after the facts became known had it hesitated to appeal to the ultimate test of arms.¹

But, while admitting the justification of war for the maintenance of high ideals, for preservation of liberty and for justice (and, in consequence, the inevitability of war in the present state of civilisation) we must deny any justification of wars of aggression, wars for power, and wars for greed, for extension of empire or the power to impose ideals upon others, arguments in favour of war which are put forward by the school which is represented by Treitschke, Bernhardi and other Teutonic Militarists. Their attitude is that war is such a good thing in

¹ It is not suggested that the defence of the neutrality of Belgium was the sole, or even the principal, cause of the War, but it was the formal and official immediate cause, and it amply provides the justification for the action of Great Britain and shows the inevitability of our participation in the War.

itself, so beneficial to man, that it is justifiable quite apart from the purpose for which it is waged. A few quotations from Bernhardi will indicate the trend of his opinions, which may be taken as representative of a considerable school of militarists.

"Might is at once the supreme right and the dispute as to what is right is decided by the arbitrament of war. War gives a biologically just decision, since its decisions rest on the very nature of things."

"War is a biological necessity of the first importance, a regulative element in the life of mankind which cannot be dispensed with, since without it an unhealthy development will follow, which excludes every advancement of the race and therefore all real civilisation."

"The law of the stronger holds good everywhere. Those forms survive which are able to procure themselves the most favourable conditions of life, and to assert themselves in the universal economy of nature. The weaker succumb. This struggle is regulated and restrained by the unconscious sway of biological laws."

All through Bernhardi's writings is shown an overwhelming belief in Germany's historic mission to impose her Government and culture on others. The only alternative that he can see to world power is downfall. In the merciless struggle for existence with which his mind is obsessed, there are only two courses open: death or domination. But all this conception of dominant empire, of bureaucratic government, of imposed German-made moralities and culture and custom upon others is based on a false application of the principles of evolution. Survival is to Bernhardi the sole test of right. His is a plea for national egoism bolstered up by a false appeal to the principles of evolution.

That this false conception of evolution is not confined to Bernhardi and Germany may be seen from an article in the "Nineteenth Century" for July, by H. F. Wyatt. This article originally appeared in the "Nineteenth Century" for April, 1911. I refer to it mainly because it has been reprinted at a moment when the mind of the country must be particularly susceptible to any teaching on the subject of war, and conse-

quently any erroneous teaching (if it is erroneous) is the more dangerous.

Wyatt speaks of the biological law of competition as still ruling the destinies of nations as well as of individual men. "Victory in war," he says, is the method by which, in the economy of God's providence, the sound nation supersedes the unsound. "*The survival of the fittest means the survival of the ethically best.*" Again, in a recent letter to the *Times* of September 25th, the Bishop of Down says, "The truth is that modern Germany is animated by a totally different spirit. *That spirit is simply Darwinism turned into an ethical principle.*"

Huxley, in his Romanes Lecture of 1893, appears to have been influenced to some extent by a similar conception of evolution. He says, "Let us understand once for all that the ethical progress of society depends not on imitating the cosmic progress, still less in running away from it, but in combating it." It is surely rash to assume that there is antagonism between the cosmic process and ethical principles. Doctor Sarolea, in his "Anglo-German Problem," says, "In our day we see many militarists still adducing Darwin as the exponent of a military philosophy. There could be no more shallow and confused interpretation of the Darwinian theory as applied to human society. For no thoughtful Darwinian would be prepared to admit that the fittest are the most warlike, or that the struggle for life must necessarily take the form of war. On the contrary, a Darwinian would remind us that war is the application of anti-Darwinian principles, and that war, like emigration, by eliminating the young and the brave, tends to the survival of the most unfit. To the English Darwinian philosopher, the struggle for life takes many forms, and the decisive struggle for life in modern humanity is not the external and superficial struggle of the battlefield, but the permanent and deeper internal struggle of the city, of the laboratory, of the workshop, of the home, of the soul, the struggle for political rights or legal rights, the struggle for religious freedom, the economic struggle for a living, or for a higher standard of living, the struggle for truth." Although Doctor Sarolea

describes the process in a somewhat inverted form, he shows, I think, a clear and true conception of the main principle of evolution—that environment, in its widest and fullest sense is the selective agent eliminating that which is not adaptable and tending to retain and multiply that which is adaptable, and he shows a keen appreciation of the wide range of the selective power of the modern social environment.

It cannot, however, be too much emphasised that the law of evolution by variation and selection is a natural law in precisely the same category as the law of gravity or the law of the conservation of energy. As a law it has no more to do with ethics than a problem in Euclid has to do with religion. To suggest that the law of evolution is antagonistic to ethical principles is equivalent to saying that the law of gravity is contrary to ethical principles because the apple falls when it comes off the tree. It is possible that the expressions "struggle for existence" and "survival of the fittest," containing, as they do, a suggestion of conscious effort and of ethical significance have been to some extent responsible for a certain amount of popular misconception. Put in its simplest form, the Darwinian hypothesis is merely this :—

- (1) Given suitable conditions, organisms reproduce themselves and increase in numbers.
- (2) The numbers may become so great that it is impossible for all to survive.
- (3) Those survive, or tend to survive, which are most adapted to their environment.
- (4) It is the environment which thus governs selection, is, in fact, the selective agent.

All that the expression "struggle for existence" means is that, in the process of selection, one may be taken and the other left. There is not implied any conscious rivalry, any conscious competition, such as may be imported into the word "struggle." In the same way, the expression "the survival of the fittest" means no more than the survival of that which is selected. Both these expressions have, from the days of their first use, invited misinterpretation through the sense which may be read into them of conscious action and ethical meaning. It

is the introduction of the conception that that which survives has a moral right to survive, which appears to have led to the Bernhardi philosophy of might being right because it survives, and for that reason alone. What has to be realised to-day—and this seems to me to be the great lesson to be learned from a study of the principles of evolution—is that man has a very considerable power to determine what is to survive. If this be true a colossal responsibility rests upon man. He may by his actions cause to survive that which he knows to be good or that which he knows to be evil. By his influence upon environment he possesses a considerable control. He may create survival values. The beneficial effect of his influence in this direction will depend entirely upon his ethical principles. Just as man might, if he chose, breed hideous, gruesome beasts by selection, and thus produce horrors, so he can by his influence over the environment of his own race give survival value to base and evil characteristics, and thus cause the deterioration of the race. He is working within the laws of evolution. He may, on the other hand, so influence environment as to tend to give survival value to the highest and noblest characteristics, and thus, working within the same laws, he is raising the ethical standard of the race. Because the Germans have, to a large extent, glorified brute force, and have tried to set up an environment which would give brute force a survival value, it is scarcely fair to the Darwinian hypothesis to say, as the Bishop of Down says, that they have turned Darwinism into an ethical principle.

Accepting the inevitability of war, let us now consider the racial effect of war and preparation for war. And let us see to what extent man may influence this effect by the exercise of reason. For if war be justifiable, and at least in our era inevitable, it is desirable that we should do what lies in our power to mitigate any bad racial effects it may have.

When we come to a consideration of the actual effect of war upon the race, as far as it can be judged, there would seem to be much conflicting evidence. There would appear to be a general concensus of opinion that preparation for war is beneficial. It sets a high physical standard and it trains to that standard. It increases the moral of the nation and may give survival value

to certain desirable characteristics. As a selective agency, it is also possibly advantageous. It must certainly tend to give many families a healthier environment than they would otherwise have, and in this direction it must improve the health of the nation. We may also remember that to be prepared for war is one of the most effectual means of preserving peace and thus promoting the welfare of the race. It is also necessary to be prepared for war if a State desires to possess power for good in the councils of nations. Between universal training and a large standing army there is a vast difference from the racial standpoint. A large standing army, if it leads, as it does in many instances, to the foregoing of the marriage tie and to promiscuous sexual intercourse, must be prejudicial to the future welfare of the race.

The racial effect of actual war would seem to vary greatly. Certainly there are wide differences of opinion between investigators. It is so short a time since Chancellor Starr Jordan read a paper before the Society on "Eugenics and War" that the principle arguments to show that war is dysgenic will still be in your memory. You will remember the main line of his argument. War tends to deplete the best stock in a nation. If a nation has destroyed its bravest, its most courageous, its most soldierly men, it will cease to breed that kind of man. You will remember the examples he drew from history, how he attributed the decay of the Roman Empire to its incessant wars; how the Thirty Years War injured Germany by killing off nearly two-thirds of the people; how the Napoleonic wars had the effect of lowering the average stature in France, and other examples of a similar kind.

This line of thought is also adopted in a recent article in the "New Statesman." Speaking of Rome, the writer says the Recruiting Officer rejected the halt and the blind, the feeble-kneed, the easily fatigued, saying, though he did not know it, "You are not good enough to be a Roman soldier: stay at home and be a Roman father." Dr. Starr Jordan, however, admits that there was a time when the struggle of armies resulted in a survival of the fittest, when the race was indeed to the swift and the battle to the strong, but he considers that modern con-

ditions render war almost entirely a process of reversed selection.

Nietzsche, in "Human, all Too Human," appears fully to recognise that war may be destructive of much that is best. He says: "The greatest disadvantage of the national army, now so much glorified, lies in the squandering of men of the highest civilisation; it is only by the favourableness of all circumstances that there are such men at all; how carefully and anxiously should we deal with them, since long periods are required to create the chance conditions for the production of such delicately organised brains. But as the Greeks wallowed in the blood of Greeks, so do Europeans now in the blood of Europeans; and, indeed, taken relatively, it is the most highly cultivated who are sacrificed, those who promise an abundant and excellent posterity; for such stand in the front of the battle as commanders, and also expose themselves to most danger, by reason of their higher ambition." It would be difficult to find a more clear and definite notion of the dysgenic aspect of war than this.

Sir Ronald Ross has recently questioned the soundness of Dr. Starr Jordan's views. He says that there is not sufficient proof that warlike nations deteriorate to enable any general law to be laid down. He shows that often the most virile periods followed great wars, as, for example, the wars of the roses and the wars of Frederick the Great. He urges that fine races, such as the Zulus and the Masai of Africa, and the Sikhs of India, are pre-eminently warlike races and fine races. He might also look nearer home and draw attention to the magnificent physique of the Scottish Clans, which, till one hundred and fifty years ago, were incessantly fighting and killing one another. Sir Ronald Ross concludes that war is a dreadful thing, but nevertheless it may quite possibly be utilised by nature for raising racial standards.

McDougall gives a vivid instance of the racial benefit of war. He says, "As one travels up any of the large rivers of Borneo, one meets with tribes that are successively more warlike. In the coast regions are peaceful communities which never fight, save in self-defence, and then with but poor success;

while in the central regions, where the rivers take their rise, are a number of extremely warlike tribes, whose raids have been a constant source of terror to the communities settled in the lower regions of the rivers." Comparing the peace-loving with the warlike tribes, he says, "In almost all respects the advantage in character lies with the warlike tribes. Their houses are better built, larger and cleaner. Their domestic morality is superior. They are physically stronger and braver, and physically and mentally more active and in general are more trustworthy."

I am afraid my conclusions are somewhat indefinite. The truth on the whole matter is probably to be found, as usual, between the extreme opinions. It is probably true to say that every case must be considered on its merits, that the eugenic and dysgenic effects of war are infinitely varied according to circumstances.

It is probable that the dysgenic effect of war is far greater to-day than it was in primitive times. It may be urged that while individual and tribal combat may have been eugenic, the conditions of war between large groups, under modern conditions of mobility and machine power, are mainly dysgenic. The subject is so large and the conditions so variable, the consequences so far-reaching and indeterminable, that it is impossible to dogmatise. It is, however, safe to say this: war under modern conditions contains a great number of dysgenic influences. Let us therefore look to these and see to what extent we may mitigate these influences by the application of sound principles with common sense. For the sake of convenience, a constructive eugenic policy in time of war must be applied to two classes, the combatants and the non-combatants.

THE COMBATANTS.

The main dysgenic effect upon the combatants is the killing of a high percentage of the best of the nation. Every regulation, every invention, which in war must reduce the dysgenic effect ought to be adopted. Now the actual deaths due to war are less numerous than most people imagine. Mulhall gives the loss to Europe in wars from 1790 to 1880, a period of 90 years,

as under $3\frac{1}{2}$ million men. It might be useful to consider these figures in comparison with deaths by preventible disease and preventible infant mortality in Europe during the same period.

But of these deaths from war, the vastly greater proportion are due to sickness. In the Crimean war, 1854-56, out of 1,460,500 who took the field, 51,945 were killed in battle, 66,397 died of wounds, while 491,455 died of sickness, the total loss being 609,797.

In the Franco-Prussian War, 1870-1871, out of 1,713,000 who took the field, 60,782 were killed, 46,710 died of wounds, 59,259 died of sickness, the total loss being 166,751.

These two instances serve well to show the effect of the circumstances in different cases. The Crimean War was fought under the worst conditions it is possible to imagine as regards nursing and surgery. By the date of the Franco-Prussian War, immense strides had been made in the methods of dealing with wounds in the field. Chloroform was employed on both sides; nursing had improved. Since the Franco-Prussian War, antiseptic treatment has been introduced, and we have seen a gradual but steady improvement which culminated in the close attention paid to both military and naval surgery by the Japanese in their war with Russia. It is credibly stated that when a Japanese warship was shortly going into action the men were all ordered to take a bath with some disinfectant and to don clean freshly boiled underclothing. Thus they substantially guaranteed that the operations performed on them by the Russian missiles were aseptic. Without further extending this question, it is necessary to urge that even to-day far too little attention is being given by the nations which consider themselves the most civilised in the world to this aspect of war. From the racial standpoint, it is of the highest importance, and no monetary cost should be allowed to stand in the way of the most complete and ample provision for dealing with the sick and wounded. While the exigencies of war may at times warrant the most prodigious sacrifices of men to death on the battlefield from the bullets of the enemy, there is no conceivable excuse for sacrificing a single life that might be saved by more efficient hospital and medical arrangements.

From the eugenic standpoint, the question of the selection of the combatants from the nation by voluntary or compulsory systems is an interesting one. We have already pointed out the eugenic advantage of universal training. In the relative merits of voluntary and universal service or conscription, there is also a eugenic question. Universal service tends to spread the losses to the nation over a wider area. Under a voluntary system the tendency must be for the war death-rate to strike most heavily the fittest of the race. An over careful selection of volunteers for service, the adoption of too high a physical standard, accentuates the dysgenic effect of war, but here one must recognise the military as well as the eugenic aspect of the war. From a military point of view, a voluntary army is probably far more efficient for its numbers than a conscript army. Although it might conceivably be beneficial to the race to place its least fit specimens in the front fighting ranks, one can scarcely imagine that such a course would commend itself from the military point of view. One willing fighter is worth six pressed men, and there can be little doubt that the superiority of General French's Army to the enemy it has had to meet is largely attributable to the voluntary system. As to the effect of universal training, it may be said that universal training without conscription would have the effect of raising the physique and moral of the nation, and in time of war would enormously increase the number of recruits for voluntary service. It is probable, therefore, that the best combination from the military and eugenic standpoints would be universal training with voluntary service for war.

Another question that is of the utmost importance from the eugenic standpoint is that of encouraging the marriage of those about to go to the front. Here we must recognise the sensible action that has been taken at the instance of the Archbishop of Canterbury in reducing the marriage fees, and it is to be hoped that the Government will accede to the Archbishop's suggestion and temporarily waive the Government marriage licence duty. The encouragement of recruits to marry is far-reaching in its importance. Not only will it directly tend to the maintenance of the race through the better stocks, but indirectly it must have

an important influence in checking one of the most deplorable dysgenic effects of war, merely, the increase of venereal disease.

NON-COMBATANTS.

It is of the utmost importance that the nation should virtually guarantee to support in a suitable condition the wives and families of those on active service, and here we must recognise the soundness of the Government's action in increasing the family allowances. Those at home who are in a position to do so should co-operate to maintain the families of soldiers and sailors in that sphere of life to which they have already been raised by the efforts of their forbears.

Every possible means should be taken to prevent the economic disturbance due to the war proving disastrous to those who, by reason of age or other cause, have been unable to go on active service.

It is probably among the middle classes that the greatest amount of distress will prevail, both during and after the war. Out of a total of 16,284,399 persons of both sexes engaged in occupations, and of ten years of age and upwards, 714,621 are in professional occupations, and their subordinate services. It is amongst these that distress will be inevitable. Amongst the industrial classes there is far less chance of distress. The industrial classes are to-day well organised and well cared for by the State. The machinery of the state is well constructed to deal with them. The Board of Trade and the Labour Exchanges, the Local Government Board, the Municipal Bodies and the Trades Unions; these bodies can do, and have already done, much to prevent distress. It is doubtful whether the sufferings of this class will in the main be severe. There must be dislocation of industry, but, with large numbers enlisting and with large orders for war materials, and with efficient machinery to assist the mobility of labour, distress is likely to be only temporary, at least during the term of the war. After the war, new industries will be started, new openings for trade created, and it is probable there will be work for all at some rate of pay, even if it may take some little time to find it. Amongst those whose normal incomes range from £1 to £2 a week, there will not be much suffering. It is in the middle

classes, both lower and upper, and particularly among the women of this class, that there will be really acute suffering. Amongst journalists, authors, actors, painters, sculptors, architects, musicians and clerks there will be a great pinch of poverty. In normal times of peace, a rich country can legitimately support a large section of its population in professional and artistic occupations. The product of such people's work is, in normal times, of a high money value, ranging from, say, £150 to £1,200 a year, according to supply and demand. In times of war, the demand for such services falls very rapidly : the value of the product diminishes. These people have, by dint of hard work, often through several generations, raised themselves to what has been legitimately considered a higher sphere of occupation. Without depreciating the virtue of non-intellectual manual labour, it is obvious that work requiring great skill and talent and a prolonged apprenticeship, often preceded by a long non-productive educational period, not only ranks higher in money value, but attracts a class whose natural talents and laudable ambitions invite them to raise themselves to this sphere. These people have become accustomed to conditions under which they can legitimately afford and enjoy certain benefits which civilisation gives, benefits which would not be enjoyed by those whose faculties had not been developed. Many of this class now find themselves, through no fault of their own, but because of economic conditions due to the war, in a position of great need.

They cannot easily acquire dexterity in manual work. The better paid kinds of manual labour require years of apprenticeship to obtain such skill as will command a remuneration of anything over 30s. or £2 a week, and even though the skill could be acquired, in many cases there will not be the physical health and strength needed for such work.

In certain fields of enterprise, intellectual workers who depend for payment on surplus wealth will be almost ruined. Should the war last for twelve months, the loss of wealth and diminution of credit will be very great. France and Germany; Russia, Belgium, Austria, Hungary, and Servia are already engaged in war while active hostilities have involved Japan

and South Africa beyond the seas.¹ Should the war last more than a year, the loss of capital will be prodigious, and money must in consequence be rendered dearer for many decades to come. Money may be cheap during the war, but this must not blind us to the fact that it will be dear after the war. This must affect most seriously the middle classes of this and other countries, the classes that attempt to live decently and intellectually at incomes ranging from £150 to £1,200 a year; that give their children a sound education at a cost which often absorbs a large part of their incomes for many years; classes which are not luxurious. These classes contain men and women to whom the country owes much. To quote from Sir Harry Johnson's article in the "Nineteenth Century" for September, "For at least 300 years, it is the middle class that has made the British Empire and contributed its greatest glories in literature, art and science; the middle class that produced Drake, Shakespeare, Newton, Harvey, Milton, Dryden, Wedgwood, Darwin, Dickens, Thackeray, Tennyson, Huxley, Brummell, James Bruce, Mungo Park, Speeke, Grant, Captain Scott, Charles Kingsley, Gladstone, Bright, Disraeli, and all the noteworthy persons of the present day in the Church, at the Bar, in the Army and Navy, in painting and literature, in education, in science, surgery, chemistry and mechanical inventions."

It is in the widespread injury of the war to this class, apart from the loss of life entailed on the battle-field, that the real injury to the nation lies. Is this a dysgenic effect of war? I think it is.

A condition is produced which is not conducive to the perpetuation of the best of the race. War is shown to be an agency—under social control—which tends to impair the racial qualities of future generations physically and mentally. This class, from which it is pre-eminently desirable that the largest number of children should be born, is, by the economic conditions arising out of the war, crushed down and dissuaded by circumstances from reproducing its kind. Still further cause to restriction of families is given. Bred from a race gifted with

¹ Turkey, Asia Minor, and Egypt must now be added to this list.

taste to enjoy in reason the intellectual and physical standard that requires a certain income to maintain, this class will struggle to keep its place, and to do so will sacrifice marriage and parenthood. Criticise this if you will; it is what must happen. This blow struck at the middle classes of this country is a great calamity, and every possible step should be taken to reduce it. It is upon this class also that the burden of taxation will fall after the war. One may quote Southey :—

Satan gave thereat his tail
A twirl of admiration,
For he thought of his daughter War,
And her sucking babe Taxation.

War may be glorious in prospect. It may be inevitable. It may be justifiable. While it lasts we may suffer, but the excitement is intense. Every nerve is strained to bring to it but one conclusion—victory.

But war has to be paid for and the payment comes after the war. The loss to the nation in lives, in wealth : these will be felt for many years. The present war will be more costly in men and in money than anything the civilised world has known before. Let us recognise this and be prepared.

THE MEASUREMENT OF INTELLIGENCE.¹

By DR. T. SIMON.

Translated from the French by DR. W. C. SULLIVAN.

In the ordinary course how do we gauge anyone's intelligence? We receive a first impression of the individual's general demeanour, of the aspect of his physiognomy, of the vivacity of his look, of the mobility of his features. We take in all these elements at a glance. We feel them as a single general impression. Then, when we wish to find a more solid basis for our opinion, we are no longer content with this external view; we seek to reach what lies behind the façade; and to do this, we get into conversation. To make a person talk is the best way that has yet been found for ascertaining what he has in his mind. In conversation, the sound of our interlocutor's voice, the flexibility of its intonation, the fineness of its shades, are all elements that tend to confirm or weaken the opinion we may first have formed. And then the degree of attention that he gives us, for we are always sure that our remarks are worth listening to; his quickness to grasp our meaning, saving us from any need to present, under simpler forms, the idea we wish to convey or to illustrate it by concrete examples; his replies, which anticipate what we were going to say, or which sum up a complex question in a few vivid words—by such various details as these we are able in the course of conversation, to estimate the intelligence of the speaker.

But it is obvious how entirely subjective such a mode of procedure must be, to what an extent it is based on fugitive impressions. As a matter of fact, what usually happens is that we form in this way at the start a very positive and decided opinion; we say, this is a man of average intelligence, or this is a man of superior intelligence, and then, at the first objection

¹ Delivered at a meeting of the Eugenics Education Society held by kind permission of the Royal Society, at Burlington House, April 18th, 1914.

that is raised, we modify our judgment, and as we pursue our examination further, we discover proofs of stupidity in the man whom we judged highly intelligent because he seemed to agree with all our opinions, or we find indications of quickness of wit in one whom we had set down as hopelessly dull.

Nor is this the only defect of the ordinary method: the opinion based on it is strictly personal to the individual who formulates it; it requires in him that aptitude which we characterise as the art of understanding men, and which consists doubtless in knowing how to give its proper value to each of the several elements which we have touched on. Further, if we can estimate the intelligence of an adult after this fashion—because we have a schematic conception of what an adult is and how he ought to acquitted himself in an ordinary conversation—we have nothing of the sort in the case of a child, we have no fixed points to guide us in judging of intelligence during that period of continual evolution.

Without, therefore, questioning in the least the value of a clinical examination, one principal merit of which is its admirable flexibility, it has been impossible not to feel the need of substituting a purer method for the ordinary method which we have just criticised. From the theoretical point of view, the question had long been urgent. It was becoming no less so from a practical point of view in France at the time when Binet specially directed his activity to its solution, for in 1906 the Ministry of Public Instruction had just appointed a commission to inquire into the measures proper to be taken in the education of abnormal children—of those children who are designated in England by the term “feeble-minded”—and as a first step it was necessary to be able to recognise them.

It was to such preoccupations as these that the metric scale of intelligence owed its origin. Consonant with that origin, it is applicable above all, and almost exclusively to children and to defectives, but it embodies at the same time a general principle of method which admits of further development in measuring intelligence.

A glance at the accompanying table will show you the brief enumeration of the tests which we use, 62 in number, these tests

being for the most part arranged in groups of 5, each group under the rubric of a given age.

3 months.—Follow with eyes the movement of an object.

9 months.—(i.) Attend to sounds; (ii.) grasp an object on contact; (iii.) grasp an object on seeing it.

1 year.—Recognise food.

18 months.—Say "mama" spontaneously.

2 years.—(i.) Walk; (ii.) obey one simple direction.

3 years.—(i) Point out nose, eye, mouth; (ii.) repeat two digits; (iii.) enumerate the objects in an engraving; (iv.) tell surname; (v.) repeat a sentence with six syllables.

4 years.—(i.) Tell whether a little boy or a little girl; (ii.) name key, knife, penny; (iii.) repeat three numerals; (iv.) point out the longer of two lines.

5 years.—(i.) Find which is the heavier of two boxes; (ii.) copy a square; (iii.) repeat a phrase with ten syllables; (iv.) count four pennies; (v.) reconstruct a card cut out diagonally into two pieces.

6 years.—(i) Distinguish morning and evening; (ii.) define common objects—fork, chair, table, horse, mother—by use; (iii.) copy a rhomb; (iv.) count 13 pennies; (v.) compare a number of drawings of faces from an æsthetic point of view.

7 years.—(i.) Point out right hand and left ear; (ii.) describe an engraving; (iii.) do three simple errands; (iv.) give sum of three pennies and three halfpennies; (v.) name four colours—red, blue, green, yellow.

8 years.—(i.) Make mental comparison between fly and butterfly, wood and glass, paper and cardboard; (ii.) count from 20 to 0; (iii.) point out features missing in incomplete figures; (iv.) give the date; (v.) repeat five numerals.

9 years.—(i.) Take 2d. out of a shilling and give the change; (ii.) define common objects (see above) otherwise than by use; (iii.) recognise all the current coins; (iv.) name the months; (v.) answer five easy questions.

10 years.—(i.) Arrange six boxes (3, 6, 9, 12, 15, and 18 grammes) according to weight; (ii.) copy two simple geometrical designs from memory; (iii.) criticise absurd statements; (iv.) answer five difficult questions; (v.) bring three given words into two phrases.

12 years.—(i.) Resist a suggestion; (ii.) bring three given words into one sentence; (iii.) say more than 60 words in three minutes; (iv.) define abstract words; (v.) re-arrange a simple sentence, the words of which have been put out of their order.

15 years.—(i.) Repeat seven numerals; (ii.) find three rhymes for a given word; (iii.) repeat a sentence of 26 syllables; (iv.) interpret an engraving; (v.) explain an unfinished account of a common episode.

Adults —(i.) Paper-cutting test; (ii.) mental construction of figure formed by transposing pieces of bisected rectangle; (iii.) distinguish between abstract words of similar sound or similar meaning; (iv.) indicate three differences between a king and the president of a republic; (v.) give précis of a selected passage of prose.

Each of the tests is in the form of a question or of a simple little operation varying in difficulty. They require practically no apparatus, or at all events so little and of so simple a sort that anyone can make its most complicated elements in a few moments, and when prepared it is as easy to carry about as a stethoscope. Further, all the tests are so quickly got through that probably the longest of them is that which consists in asking the subject to repeat as many words as he can in three minutes, and the determination of the subject's mental age does not take more than 20 minutes, and may be arrived at in an even shorter time.

(Three tests—putting together divided card, the paper cutting test, and description of pictures—were then demonstrated by the lecturer.)

So much by way of example, but the essential point, and that on which I wish especially to insist, because it is the very principle of the method and its original feature, is the seriation of our tests. There is a hierarchy in this arrangement. And it is not a hierarchy established by *a priori* considerations. It is based on facts. Here is the way it was arrived at. We proceeded by several stages. The first stage consisted in trying a number of the tests. Taking a series of weak-minded subjects, chosen more or less at random, we picked out amongst them the most pronounced cases, those where there could be no doubt as to the defect of intelligence and it was with these subjects—idiots, imbeciles, and low grade morons—that we tried such tests, for example, as offering an object and observing in what way it was grasped, or showing a picture and asking a description of it. It turned out that tests which, in our opinion, should have presented no difficulty were missed, while others, which seemed to us to be equivalent, were successfully got over. Gradually all that fell into order; and we accepted as easy the tests solved by those subjects whom we recognised clinically as the most defective; while we ranked as difficult, as requiring more intelligence, more intellectual resources, the tests which were performed only by the subjects of manifestly higher development. During this first phase, accordingly, our tests were grouped in terms of intelligence and in conformity with

clinical indications. Second stage: it is an idea which must suggest itself to any observer of states of intellectual non-development that they may be compared to the different phases of childhood. You will find, for instance, in Esquirol such expressions as this; after he has described a case of imbecility, he will add: "this young imbecile resembles in every respect an infant of 5 years of age." This, however, in the pages of the alienists is only a mere phrase, a comparison which is little more than literary. We, on the contrary, had got hold of a series of exact tests on which to base our estimate of an arrest of intelligence; our recollection of our first results and some additional experiments showed us, between the replies of our asylum patients and the replies of children, strange analogies amounting often to an absolute identity. It was the obvious course to ascertain whether the grades which we had found in feebleness of mind really corresponded to grades of age in normal children. Our first investigations were rather timid, for we limited ourselves to the ages of 3, 6, and 9 years. They were sufficient, however, to prove to us that the seriation of tests which we had based on differences of intelligence held good when we applied these tests to children of different ages. We were accordingly led to formulate the following postulate—*intelligence is a function of the child's age*; and we then entered into a third period in which we applied ourselves to following the development of an infant mentality year by year. We multiplied the number of tests. We tried them methodically in the schools on children of 6, 7, 8, and 9 years, and so on. And in this way, by long afternoons of observation, by patient labour, often irksome because monotonous, but always fruitful, we reached the seriation which we now utilise.

Here, then, is the meaning of the grouping by age which you see in our table. It means that, if, for instance, we take a number of children of 5 years old in a Paris elementary school and make them copy a square, count four objects and so on, these children will perform these operations successfully and they will also do all the tests allotted to the ages below 5 years, while, on the other hand, they will be incapable of dealing with

the tests in the higher groups; *e.g.*, they are quite well able to count four pennies but they cannot count 13.

And now you will understand why I said a moment ago that what was essential in the method is the seriation of the tests. It is because that seriation gives us at once the value of the subject's responses to the tests. Suppose—and I am quoting to you an actual instance—that we are examining a worthy man of some 50 years of age, and that, in the usual course, we ask him his name and he gives it correctly, and we then ask him his age, and he answers in all good faith, "I'm 12 years old." Of course, we know at once that we are dealing with a defective. But, thanks to our scale, we know something more; we can have a strong presumption that his intellectual level is between 3 years and 6 years, for 3 years is the age when the surname is correctly given, and 6 years is the age when a child knows how old he is.

In the case of all our first tests, for ages from 3 to 12 years, our investigations were made in infant and elementary schools. Two other parts of our scale remain; one, having to do with the lower degrees, from 3 months to 2 years; the other, on the contrary, with the upper region of the scale, that is to say, with the tests for 15 years of age and for adults. With regard to the lower degrees, they have only been studied by us in crèches, and the results are therefore subject to qualification, and may not apply to children brought up under other conditions. As for the tests which we give as corresponding to the adult intelligence, they have been arrived at from experiments made on members of associations of former pupils of the elementary schools. All we have to note specially about the results we have obtained with these subjects is, then, that they refer to ages subsequent to school years.

This, then, is our method, and it is after the manner I have described that it has been devised. It is above all a result and an epitome of observed facts. If we have assigned certain tests to the age of 9 years it is because we have found that they are successfully passed by children of that age, while they were not passed by children of 8 years, and so on.

II.

Now, what is it exactly that we measure?

(1) We measure intelligence as a whole; and this is what I mean; if we could study closely each of these tests, one after the other, we should find first that they all require attention and good will, and also a certain amount of comprehension, but in different degrees; it does not need much sustained effort to perceive the difference between two weights of 3 and 15 grammes; it demands closer application to arrange five weights in order when of the respective values of 3, 6, 9, 12 and 15 grammes; for the subject to point to his nose is certainly easier than to take 2d. from a shilling and give the change. On the other hand, the passing of certain tests—repeating digits or phrases—depends above all on immediate memory; other tests, such as the naming of colours or enumerating the months, seem to depend on positive knowledge; while success in others again is the result of the subject's power of judgment, as, for instance, in detecting an absurdity. Or it may be the inventive capacity that we bring into play, as when we require the subject to get three words into a phrase; or it may be the power of visual representation, as in the paper-cutting test. Or else it is all these faculties, more or less, that are utilised, for we must recognise that their isolation is artificial and a figment of theory, and that in reality every mental operation, even if it be but the simplest sensation, requires the activity of the mind as a whole.

The lowest tests on the scale are tests of muscular co-ordination in response to sensory stimuli. Then there are tests requiring the use of words, and others, such as copying a square or a rhomb, which give proof of motor skill, and so on. We do not analyse; we grasp intelligence by its total result, without attempting to separate its constituents; and we measure it, in some sort quantitatively, pretty much as we say, when we speak of electricity, "this is a current of 100 volts."

To analyse what is attributable in the results to attention, what to memory, and so forth; to determine the part of his several faculties in accounting for the degree of a child's intellectual development—that would be a totally different task, the object of a different investigation, and of an investigation,

doubtless, of no less importance, but hardly, I think, one that we are yet near being able to undertake with profit.

(2) The second point we have to deal with concerns the chief objection urged against us on grounds of theory. As we judge by results, it is at once said, " You do not measure intelligence, you measure acquired capacity (*l'acquis*); you measure a state of intellectual development, an intellectual level, if you will, but that is not the intelligence. You have, it is true, eliminated from your tests exercises of reading and writing, you may make one of your examinations without noticing whether the child you are examining knows how to read; you have not fallen into the obvious error of asking the date of Napoleon's death or the names of the chief towns of Asia, because the absence of these notions is clearly a proof only of ignorance; you have been careful to avoid also questions dealing with local matters, such as tariff regulations or the name of the reigning sovereign, for the capacity to answer such questions is due to curiosity, and to a curiosity that certain peasants lack, who, nevertheless, within the narrow circle of their immediate interests show no want of intelligence. Yes, you have taken all these precautions, but for all that your efforts remain vain. You measure results; and in these results the action of circumstances always intervenes; you put problems, but their solution always depends on what the family environment has taught the children. Here is the proof that this objection is sound: if you try your tests in a different social milieu, on a better class of the population, if, as M. Deeroly and Mlle. Degand have done, you examine children of wealthy parents, these children will appear more intelligent, judged by your scale, they are in advance of their age, they show themselves more developed than the children of working-class parents. And after all, when we use tests such as the enumeration of the months, or taking change out of a shilling, are we not really estimating the effects of special sorts of training? "

The objection is a formidable one, and I think that I have presented it without diminishing its force. It is so plausible that we have ourselves sometimes been disturbed by it. First of all, let us recognise that it is quite true that we measure

results only and that the degrees of intellectual development which we gauge are the resultants of multiple factors. When we use our scale in the psychological examination of a child, we are doing, from the psychic point of view, something analogous to what we do, from an organic point of view, when we use a tape measure. When we read off with our tape a measure of height, the figure results in part from a personal factor, a force of growth with which the individual came into existence, and in part from influences of environment, from the conditions of nutrition, temperature and the like to which he has been subjected. The measuring tape does not distinguish these elements. Stature is the resultant of these different forces, and it varies, like intellectual development, in different social milieux. Nevertheless, stature is an important measure, which we should not like to dispense with in estimating the physical state and the vigour of a child. Similarly, when our scale indicates to us the stage that a child has reached, when with its help we measure what his intellectual faculties enable him to do, this development which we measure is the result, on the one hand of a personal element, an innate cerebral constitution which enables our nervous system to make certain acquisitions and to profit by them, and on the other hand it depends on the influence of the environment, on the stimuli that we receive from our surroundings. All that is true. But none the less would it be incorrect to say that what we measure is simply this action of the milieu, for that action would be of no effect without an intelligence to work on; we measure the whole as an indissoluble totality, as, in fact, the personal element and the environmental factors do in all likelihood present themselves in reality; for we may conceive the intelligence, not as something complete, not as a power endowed at the start with its full force, but as a function which is in process of perfecting itself, incessantly modified and as it were re-made by excitations from without. During the whole period of childhood the intelligence is in the making.

And further, it is, in fact, the intelligence that we measure, if the conditions of the environment where we measure its development are sufficiently uniform in character. Suppose

that twenty years ago we planted two acorns in the same ground : to-day we measure the trees into which they have grown, and we find their trunks of the same thickness ; we say then these young oaks are of the same vigour. If, on the contrary, one of them had a stem of but half the diameter of the other, we should call it weakly, thus inferring from our observation the degree of its vital force, a factor in itself inaccessible. Our whole problem is of the same order, and we may formulate it thus : have we the right to infer from the degree of intellectual development which we find in a child, the value of that somewhat metaphysical entity which we designate by the term intelligence ? This is not a question of theory but of fact, and it is for the facts to answer it.

Let us, then, take the witness of the facts. When we published our first researches and our results in 1908 and 1911, they had as their basis only a relatively limited number of observations, extending to some hundreds of children, and children who might seem to have been selected under rather special conditions, inasmuch as they were all pupils in elementary schools in Paris. When we proposed to estimate the intellectual development and the intelligence of other children by reference to this standard, it was possible to ask whether our measures were not of very relative significance. It was a measurement, no doubt, but a measurement by a standard whose value was open to question. Since then our method of measurement has been applied in England, in America, in Belgium and Holland, and in other countries. More than 5,000 children have been tried by our tests. And in a general way the results have been confirmatory, especially as regards the ages from 4 to 10 years. So that we are authorised to-day to maintain that the intellectual development which our scale shows is really representative of the average child of the white race. In other words, this international confirmation shows us that our tests imply a fairly general environment, that they are valid in the ordinary conditions under which any child in these countries has to grow up, and that they do not presuppose any special cultural influence. And if this be so, when we find differences of development between two children, it is clearly to differences of

intelligence that we must attribute them. At all events this holds good of certain differences. For, on the other hand, if we examine measurements taken in certain special circumstances, such as those referred to above, measurements, for instance, of the children of wealthy parents, we find that these children show an advance of one or at most of two years. This, then, is what represents the influence of environment. So that when, in measuring the intellectual level of a child, we find a departure from the average shown by our scale, if that variation falls within the limits we have just indicated, we may inquire whether there are special conditions capable of causing it; but if these conditions are not present or if the variation is too considerable, we may infer, with a variation in the upward direction, the existence of an exceptional vigour of intelligence, while with a variation in the downward direction we shall be inclined even more positively to conclude that the intelligence is defective. Thus we arrive logically at the practical rule that we regard as backward in intelligence any child whose intellectual development is found to be two years below that of his age as shown on our scale.

With regard to the two ends of the scale—infants and adults—our certitude in adopting a schematic average of intelligence is much less. In the case of the infants, we obtained our material, as I have already pointed out, from an unfavourable environment: the children sent to crèches cannot represent an average social condition, and that, not only on account of the detrimental influences to which the children have been exposed, but also because these children, by reason of bad heredity, are probably innately inferior. This portion of our scale may, therefore, need revision. We might guess this on *a priori* grounds, and the experiments which have been made, here and there, confirm this view; the tests are too easy; in other words what we have assigned to two or even to three years ought to be put back to lower ages.

On the contrary, our tests for 12 and 15 years and for adults are, in general, too difficult. This depends on the fact, mentioned above, that this part of our scale was framed from trials made with what might be regarded as selected material.

It would be necessary to work with random samples of subjects of these ages. This is a research still to be made, and it will not be an easy one, for after school life the individuals are scattered, and they are no longer willing to lend themselves to such inquiries; adults do not like to have their intelligence measured too closely. Besides, at that period the intelligence is developed, so that we no longer have the help of differences of age to estimate the value of the differences we detect. And lastly, professional activities tend to produce a possibly excessive specialisation of intellectual work, and that fact renders comparisons difficult. Nevertheless, this is doubtless only a question of adaptation. And we believe that by pursuing research by the method which we have used, by devising for these ages new and more appropriate tests, we shall gradually overcome these obstacles, so that we shall be able to measure an adult's intelligence with the same precision as we now measure the intelligence of a child.

III.

We are, then, in a position to compare the intelligence of a given subject with that of an ideal average child. Of what use can that comparison be to us? Let us first consider its application to the examination of abnormal children. Following on the appointment of the commission to which I have referred, a certain number of classes were organised in Paris for children who could not keep up with the ordinary teaching. But what children were to be admitted into these classes? How was the selection to be made? Of course, it is easy to find children whose educational progress is behind that of their comrades. Say a child of this sort comes before us, he is 10 years old and we find him in the lowest class of the elementary school, in school work he is barely on a level with the ordinary child of 6 or 7. What is the cause of this backwardness? Perhaps it is to be attributed to irregular attendance? And in fact we do find that illness has prevented the child from sticking to his studies. But is this cause sufficient to explain the degree of backwardness? may there not also be a question of want of attention, lack of effort, idleness? Or is it due to want of

brains? The examination of his cranium, the detection of his bumps or of his stigmata—these means do not allow us to solve this problem. Now try this child with our tests, he is 10 years old; we begin, therefore, with the tests of that age, and he fails in them. We pass to the tests of 9 years, and he is again unsuccessful. He only does some of the tests of 8 years, and all the tests below that age. In short, though he is 10 years old, he has barely the intellectual development of a child of $7\frac{1}{2}$ years. Our opinion is now fixed, he may be lazy, but besides that his intelligence is certainly more feeble than that of a normal child. It is more feeble, and yet not very much more feeble. It is that of $7\frac{1}{2}$ years, and the child's age allows us to hope that it may still develop. These are favourable conditions for trying to teach him under special discipline. We enter him accordingly for a special school. Had we found his level that of 3 years only, we should not have accepted him; we should have regarded him as beyond the reach of this educational method. But on the other hand, it might have happened that this child, reported from his school as backward in his studies and as mentally abnormal, is found on our examination to possess the intelligence of his age. In that case we should have to do with a simple "slacker," and we should require to have recourse to other methods than those of a special school. As its first service, then, our method is going to help us for the very object for which it was devised, namely as an instrument for selecting subjects for the special schools. It will enable us to form homogeneous classes. And above all, it will enable us—and I know no other method that can do this—to exclude from these schools subjects who are sent to them for insufficient reasons.

Now let us go to our asylums. There we find congenitally defective patients whose poverty of intelligence is such that they cannot shift for themselves if they are out in the world. Attempts have been made to distinguish several degrees amongst these subjects, but it has always been by means of notions of degree so vague that it is almost impossible for the different authors who have written on the question to understand one another or to know whether they are describing similar cases. We are told, for instance, that in imbeciles the

judgment is less acute, or the attention less sustained, or the vocabulary more limited than in the feeble-minded, while on the other hand all these faculties are more developed than in idiots; but as to describing how we are to estimate this keenness of judgment, this fixity of attention, this extent of vocabulary—that always seems to be postponed. But apply to these subjects our method, and we have at once the necessary data for a definite, if conventional, division of these several categories. Here are the definitions which we have been led to propose:—

We mean by the term "idiot" an individual whose intellectual development is that of 2 years or under.

We mean by the term "imbecile" an individual whose intellectual development corresponds to that of a child between the ages of 3 and 7 years.

And finally, by the term "feeble-minded" (*débile*) we mean an individual whose intellectual level, while superior to that of a child of 7 years, is nevertheless below the average development of an adult. This latter degree of development, as I have said, is still inadequately determined. Provisionally it might be proposed to fix at 9 years the upper level of mental debility. We shall see the reasons for this selection in a moment.

Now why should we take these points, at 2, 7 and 9 years, to form the divisions in a classification of mental defectives? The reason is that to each of these degrees there corresponds an important stage in mental life; the idiot, like the child under 2 years, may in a sense understand some words, but he cannot use any; it is as though language requires for its evolution an intelligence of more than 2 years. The imbecile has the power of speech, whatever imperfections he may show in its use, but written language is beyond his reach; and it is not till 7 years of age that the child, after very much the same way in all civilised countries, begins to assimilate reading and writing sufficiently to make a rudimentary use of them.

And it is not only by these deficiencies, by this incapacity first to communicate with his fellows by speech and then to transmit to them his thoughts by writing, that our idiots and imbeciles may be characterised: to each of these degrees of

defect there corresponds also a difference in the possibility of social utilisation. Every being who does not reach an intellectual development of more than 2 years remains, so far as regards his powers of looking after himself, in the same condition as a child of that age; he may be able to grasp an object, to obey a simple gesture such as a motion to sit down, but he will ordinarily be unable to feed himself. On the other hand, imbeciles of the mental level of 2 to 4 years know how to make their way about in the house where they live; they are capable of learning to wash their hands, they can make an effort to dress themselves, they are able to pull a barrow or carry a weight; imbeciles from 4 to 7 years in intelligence can learn to sweep, to make a bed, to black boots; and feeble-minded subjects, above 7 years in intelligence, can be taught to sew and can be made useful in laundry and garden work. Coming to the upper limit of intelligence in mental debility, we have reason to think that a development equivalent to the normal average at 9 years of age is the minimum below which the individual is incapable of getting along without tutelage in the conditions of modern life. A certain number of facts suggest this view and are mutually confirmatory. Nine years is the intellectual level found in the lowest class of domestic servants, in those who are just on the border of a possible existence in economic independence; it is, on the other hand, the highest level met with in general paralytics who come under asylum care on account of their dementia; so long as a general paralytic, setting aside any question of active delirious symptoms, has not fallen below the intellectual level of 9 years, he can keep at liberty; once he has reached that level, he ceases to be able to live in society. And lastly, when we examine in our asylums cases of congenital defect, brought under care for the sole reason that their intelligence would not admit of their adapting themselves sufficiently to the complex conditions of life, we find that amongst the most highly developed the level of intelligence does not exceed that of normal children of 9 years of age.

It goes without saying that in these questions of social life, intelligence is not the only factor, character has also its part. None the less, it is the case that in the care and control of the

defective, in judging as to their institutional treatment, the exact measurement of their intelligence is at present our surest guide.

To give a last example of the application of our method, this time in the domain of forensic medicine. A moment ago I referred to the case of a child brought under our notice for backwardness in his school work, now let us take another who is a source of trouble on account of his instability; he has even committed thefts and acts of violence, and such ominous terms as instinctive perversion and mental debility are being used to describe his state; I have myself written this diagnosis of mental debility in similar cases. Later on, armed with our method, I have re-examined these children, and I have found that, as a matter of fact, a large number of them had quite the intelligence of their age. It was not, then, a weakness of intelligence that was the explanation of their bad conduct, and you will grasp at once the importance of being set right as to this point, since on its knowledge will depend the direction of our reformatory efforts.

And the same thing holds true in a general manner for all criminal conduct, influences of environment, disorders of character, defects of judgment—how are we to disentangle the responsible factor? By patient investigations, with the help of our method, Dr. Sullivan has shown that the number of the feeble-minded amongst female criminals is much smaller than was thought. And when, on the other hand, there really does exist a condition of mental debility in an offender, how much more forcible will be your medico-legal report on the case when it is based on an examination susceptible of independent control, and is not merely the expression of a personal view open to denial and discussion.

Such are the services that may be rendered at present by an accurate measurement of intelligence. There are others that we can foresee. It is not merely in the case of abnormal children that a study of the intellectual development should allow of a fit adaptation of the educational programme. The whole of pedagogy must profit by a minute determination of the stages of progress. And so again, it is not only with the degrees of idiocy and imbecility that we should find corre-

sponding differences in social aptitudes; it seems probable that one might also establish a hierarchy of occupations according to the quantity of intelligence which each one requires in the individual who practices it, and it would perhaps be better to begin by such a study as a guide in directing adolescents in the choice of a career instead of losing our way at the start in the effort to ascertain the presence of special aptitudes.

Again, one would like to know at what epoch an intelligence finishes its growth; one would like to know whether this growth occurs by regular progression or whether it may not advance by discontinuous ascent with critical ages and periods of special importance; one would like to know to what extent a precocious development may be the precursor of a real superiority in later life, or whether it is not merely the mark of an over-quick maturity. All these points will, no doubt, be cleared up gradually; they require the examination of many children, and that the same children be followed in their development year by year. It is to be feared that the amount of research that these problems must necessitate will delay their solution for a long time still. But remote as that solution may be, and despite the imperfections of the instrument that we bring to assist in reaching it, we may at all events set down to the credit of our method that already it has given precision to the data of the problems, and we may in advance pay homage for the results that we hope from it, to the memory of that great psychologist and indefatigable worker—Alfred Binet.

AMERICAN EUGENICS.

By ARTHUR E. HAMILTON.

Little can be said concerning *Die Rassenhygiene in den Vereinigten Staaten von Nordamerica* that has not been admirably summarised by Géza von Hoffmann in his valuable and comprehensive review of about a year ago. A part of the little that remains to be told is here presented in the hope that it may prove helpful in bringing about a more sympathetic understanding between those who, in England and in the United States, have the welfare of eugenic research and education at heart.

At the second annual meeting of the Eugenics Research Association, held in Schemerhorn Hall, Columbia University, on June 10th and 20th, 1914, a major part of the field work done during the past year was brought to a focus, and the principal features of that conference may serve well as a background for this brief report. If the atmosphere of the assembly seems laden with the dysgenic and pathological, it must be borne in mind that most of the field workers engaged in research are connected with institutions for the mentally deficient or else engaged by the State in surveys of its socially inadequate classes. The problem of isolating the genuinely unfit and handling them for the immediate benefit of the community, and thus for the good of generations to come, lends itself better to actual grappling than any other in the eugenic programme at present, and if the energies of our young men and women are tapped off in that direction just now it is not necessarily an indication that Galton's ideal has been lost sight of, or that cacogenic problems have been selected by preference. The work chooses the worker in most cases and the investigator must usually go and do what he is told. Happily, heads of institutions are slowly beginning to see the vastly greater value there is in giving a maximum of liberty to their field staff and allowing a pursuit of tangential lines that seem at the time inconsequent and not directly concerned with the immediate problem in hand, but which may have scientific value later. However, the fact that so great a part of eugenic research lies in the domain of the morbid has resulted in a tendency to synonymise eugenics with psychopathology, and our most pressing educational problem is that of placing before people the magnificent vision that Galton had of a genuine and fundamental race improvement through conscious eugenic selection.

But the Jukes are not dead; the Tribe of Ishmael flourishes; Kallikaks still are abroad in the land; little has been done to lessen the number of Nams and Hill Folk and Hucks; and in the Pineys of New Jersey Miss Kite's return is awaited by people with swords and staves in their hands, for some of them are of sufficiently high order of intelligence to resent her revelations. Doctor Estabrook is trailing the Jukes east and west, north and south, wherever they have spread—and it is far and wide. He has found some 2,100 members of this famous family and has grouped them as (*a*) those who have succeeded in overcoming an unfavourable environment and achieving a fair measure of success; (*b*) those who, when placed under especially favourable conditions, have been able to rise from mediocrity to about the average level; and (*c*) the remainder who are still typical Jukes, backward, subnormal, incapable of responding to however stimulating a milieu they may be provided. A supplement to Dugdale's study of these people will appear before long from the pen of Doctor Estabrook, bearing the details of his research in full.

Another intensive study of one American family was brought before the association in preliminary form by Miss Isabelle Kendig, who calls

her subjects "The Hucks." "Coming to this country from England in 1623, the progenitor of this line landed at Plymouth. From there his descendants moved inland and finally settled among the hills of Western Massachusetts. There, in an isolated and unfavourable environment, they intermarried and multiplied, till to-day their blood has impregnated the entire community and rendered the town of B—— a byword for shiftlessness and poverty, for alcoholism, immorality and feeble-mindedness." Miss Kendig's chart, showing over six hundred of these Hucks, was too large to hang before her audience. It is one of the kind which even our more fossilised legislators regard with expressions of surprise.

Doctor Davenport, whose contributions to eugenics have been by no means negatively limited, brought before the conference some pedigrees showing the appearance, generation after generation, of eroticism, periodic bad temper, *wanderlust* and alcoholism. The serious student of human heredity who has gone beyond the kindergarten stage is the last person in the world to claim *wanderlust* or tantrums as "unit characters," or to hold that the presence of a saloon on every other corner of vast sections of New York has no bearing on an individual's getting drunk. And yet there are those who will read into a presentation of such pedigrees as Doctor Davenport showed an attempt to unit-characterise traits that are manifestly exquisite in their complexity and by no means reduced to uniformity of behaviour in inheritance. The charts showed periodic tantrums, or outbreaks of violent temper, cropping out in father and son, mother and daughter, father and daughter, mother and son, in such a fashion, and for so many generations, that the behaviour of this trait was startlingly unit-like. The only point their author wished to make, however, was that here we have a field rich in possibilities for further study, and that after the fact of hereditability and the manner thereof has been established, there still remains the fascinating problem of its psychophysic cause.

Wanderlust appeared much less often in women than in men. There was a faint suggestion of sex-linkage in the charts, and this called for various interpretations on the part of the environmentally inclined. Doctor Woods Hutchinson, for instance, thought that women wandered less than men because women are more afraid to go home in the dark. A lady added that women whose arms were burdened with babies would be less likely to take to the woods than men whose impedimenta was hardly more than a pipeful of tobacco. Perhaps it is a wholesome tendency, this of flying off on entertaining sociological tangents, but it certainly raises the question of the limitations of eugenic research.

Periodic alcoholism may be caused by an over-hormonisation of the blood with a consequent paralysing of certain nervous centres of inhibition. The glands which pour these hormones into the blood stream may be influenced in their behaviour by the rhythmic attraction of the moon, as the tides are, for all we know—but shall we therefore include bio-astronomy in our eugenic programme? It may be that what we inherit is not a predisposition to alcohol, but the lack of a determiner for the mechanism of inhibition that prevents a ductless gland from responding to the attraction of the moon, and that we would not even then get drunk were it not for the corner saloon and inadequate wages, but what have these things to do with eugenic research? What Doctor Davenport wished to show was that a certain form of alcoholism bubbles out in certain families much like blue eyes or blond hair, only not yet so definitely mendelising, if mendelising at all. These pedigrees were typical of the rough, pioneer work that must be done before refining measures are in order.

The function of the Eugenics Research Association is the gathering and presenting of just such pioneer data. The time is not yet ripe for generalisations, except in respect of those few traits or characters in human heredity that behave in such an obviously classifiable fashion that

there can be little danger in labelling them, and while it is sometimes stimulating and suggestive to indulge in hypothesis regarding casual relations, one cannot help feeling that a great deal of time is lost, when, at such a gathering as this, a thousand and one environmental factors that might possibly bear on a man's leaving his wife and children and taking to the road, are brought up for discussion. That outbursts of temper, *wanderlust*, and periodic alcoholism characterise individuals in certain family strains and do not characterise others in a like environment, and that these things crop out in the manner shown by the pedigree charts, should be enough for the present to encourage much more work, inclusive of as many factors, social and biological, as can be gathered along these special lines. It was gratifying to note that, on the whole, the association stood primarily for the gathering of data within its limited field and presenting it as succinctly as possible without much attempted generalisation or recommendations for immediate action.

The number of insane persons confined in institutions per 100,000 of the general population of the United States has increased during the past four decades from 86·5 to 230·0; and to-day the number varies much in different States, from 67·0 in Oklahoma to 413·4 in Massachusetts. Doctor Rosanoff told the association that these variations appear to be in correlation, direct or reverse, with the following factors: Per capita wealth production, percentage of urban population, general prevalence of illiteracy, accessibility of institutions, intra-mural conditions as reflected in the per capita cost of maintenance, and the percentage of foreign-born population. Surely, if eugenics is the study of all those agencies under social control that may improve or impair the racial qualities of future generations, such considerations as these are legitimate grist for the investigator's mill, but to some of us it seems increasingly apparent that if eugenics is to make the progress that we hope for it there must be both limitation and concentration, for, while it would prove fatal to the ideal of eugenics to have its workers put on blinders and become completely heredity-minded, nevertheless the prayer of those engaged in actual field labours must needs be more and more—"Lord, teach me to omit!" The American field worker is a novitiate of the greenest order in a new world that seems composed almost wholly of obstacles, labyrinthine paths leading nowhere, and countless will-o'-the-wisps. It is rather disconcerting to such an individual to be told that his hard gleaned data is worthless for eugenic purposes until it is somehow correlated with the number of foreign children in our schools or with the incidence of the income tax. One young woman, who has done excellent work in connection with one of our State hospitals, seemed at one time thoroughly discouraged with her methods of investigation and thought of going to England to absorb statistical methods and even some higher mathematics. Doubtless this discouragement and ambition both sprang from a wholesome soil, for it is not easy for one overflowing with energy and aspiration to settle down to digging in a little hole or furrowing deeper a narrow and shallow groove. However, this young woman was fast learning her novel line of work and on the way towards rendering a useful service by evolving from the first hand material and experience of the field itself, plans and methods that could never come from the psychological laboratory or the tabulations of the statistician. What we need to realise is that the time and effort now sunk in eugenic research is a long-time investment, and that, even if only negative results are obtained, conscientious and unremitting work along any of the main lines already mapped out by our pioneers is assuredly worth while, and that there is no golden rule to follow and no path of roses to tread, but only solid work to be done with the reward almost wholly in the working.

The problem of the dangerous immigrant is one that lies along a very definite track of research. The Surgeon-General of the United States Public Health Service and the Assistant Surgeon-General are both

members of the Educational Committee of the American Genetic Association, and their interest in all that pertains to immigration from a eugenic standpoint is vital. Under the direction of the Surgeon-General is the work of testing suspected immigrants for mental and physical defect, and the recent crop of papers and reports from Ellis Island have been indicative of a real interest on the part of the physicians in charge in the eugenic aspects of their work.

As an example of this interest, the questions asked by Howard Knox, who brought a report of the work at Ellis Island to the conference, might be cited as typical:—"How may we detect the emotional, volitional, moral and criminal defectives who are normal intellectually? How may we detect the psychopathically predisposed who are for the time being normal by all known tests? How may we say which apparently normal individuals are capable of producing insane or defective progeny?" Anybody could ask these questions. The reason they are significant here and now is because those who are in a position to do something toward solving them are alive to their importance. Already at least one talk on the hereditary significance of immigration has been given to our Congressmen in the House of Representatives, and Mendelism, illustrated by tables and ample references to an abundant literature on the subject, has found itself on the pages of the *Congressional Record!*

CORRESPONDENCE.

THE MEASUREMENT OF INTELLIGENCE.

To appreciate fully the greatness of the work of MM. Simon and Binet, it is necessary to recall the state of psychology when their epoch-making investigation first saw light. At that time, the "mental tests," initiated by the genius of Galton and taken up with characteristic energy in the United States, had so lamentably disappointed expectations as to have sunk into a general by-word of scorn.

By this one great investigation the whole scene was transformed. The recently despised tests were now introduced into every country with enthusiasm. And everywhere their practical application was brilliantly successful.

Few people, however, seem yet to have realised how curiously disproportionate has been the accompanying success on the side of theory. While psychological practice has been revolutionised, no benefit appears to have accrued to psychological science. All agree that the tests are admirable; but no one is able to say what it is that they test.

Most striking of all, perhaps, is their total incompatibility with the views always previously uttered by M. Binet himself. The latter had held the current view of psychologists, that mental ability admits of analysis into a certain number of basal powers, such as judgment, imagination, memory, etc. Accordingly, every test used by him had been elaborately devised so as to represent one of these basal powers. But in the historic work executed, together with M. Simon, this abruptly and completely disappears; all the basal powers are, without a word of warning or explanation, thrown overboard. A large number of tests are brought forward, conspicuous, indeed, in ingenuity, but wholly miscellaneous in character and random in combination.

We must, consequently, be grateful to M. Simon for having brought forward this point and for resolutely facing the difficult question, "What does the scale of intelligence which we propose, measure?" We are bound, not merely to listen to his answer with respectful attention, but also to co-operate with criticism and suggestion. His answer runs: "*The scale measures the intelligence as a whole without analysing it.*"

Surely this is a proposition which cannot lightly be accepted. When a child has run through the dozen or so ingenious little performances devised by MM. Simon and Binet, has arranged his weights in order, memorised his numbers, interpreted his pictures, and so forth, is it conceivable that he has thereby exhausted his whole vast gamut of mental ability? After all, the complete series of tests is but a small fraction of all those before and since constructed by the myriad of workers in the same field. And all the tests hitherto dreamt of by anyone at all are but as drops in the ocean when compared with the infinitely varying manifestations of intelligence of any child from minute to minute in the course of ordinary life. Half an hour, or many hours, of experimental testing can no more cover "the intelligence as a whole" than a single flower-pot can represent the entire flora of the earth.

In this dearth of explanation on the part of those who have been so splendidly successful in practical application, an appeal may be made to another series of investigations which have been going on simultaneously with those of MM. Simon and Binet, and which have had for their object, not the immediate practical application of the tests, but the discovery of the very point here in question, the nature of the ability tested. Each of these two lines of investigation furnishes a peculiarly happy and indispensable supplement to the other.

The answer reached by this second line of investigation is simple, but of wide-ranging consequence. It says that the intelligence employed in any mental performance must be analysed into two factors. The one is different for every different kind of performance or test; it seems to be identifiable with the neural structure in the brain specifically subserving that particular performance. But besides this specific factor, there is also a general one, always the same whatever the performance; this general factor in ability seems to be represented physiologically by the free energy of the whole cortex of the brain, or some still wider neural region. This analysis of cerebral action into the two factors, neural structure and neural energy, was clearly enunciated 12 years ago by no less an authority than Dr. Mott.¹

This result, gained wholly independently of the work of MM. Simon and Binet, nevertheless fits it like a glove. An explanation is at once supplied for the success of their extraordinary procedure in casting all the old basal powers to the winds, and, instead, pooling together tests of the most miscellaneous description. For if every performance depends on two factors, the one always varying randomly, while the other is constantly the same, it is clear that in the average the random variations will tend to neutralise one another, leaving the other, or constant factor, alone dominant.

This constant factor, or general mental ability, or free energy of the whole cerebral cortex, is, therefore, what the tests of MM. Simon and Binet really measure. The specific abilities, on the other hand, are left by them practically untouched.

Our explanation does not merely serve to gratify the natural human craving for intelligibility. It readily inspires a great number of most important practical consequences. Great as has been the value of the Simon-Binet tests, even when worked in theoretical darkness, their efficiency will be multiplied a thousand-fold when employed with a full light upon their essential nature and mechanism.

C. SPEARMAN.

THE EUGENIC ASPECT OF THE EMPLOYMENT OF MARRIED WOMEN: A REPLY.

It is well to point out at the commencement that we are interested in marriage only as it forms the foundation of family life, and are not concerned with so-called neo-malthusian marriages. That the best energies of married women should be devoted to the interests of home and family is a proposition about which there is not likely to be any difference of opinion. It is otherwise when, as pointed out in the note in the *EUGENICS REVIEW* for July, we are obliged to choose between a home-life whose very possibility depends upon the extraneous economic labour of the women and no home at all. Encouragement of homes which depend upon the economic labour of both parties will no doubt cause a rise in the marriage rate, but the price paid for this is the absentee mother, for she is only enabled to become a mother because for the best part of her time she is absentee. The creation of social custom on this matter would seem to be more easy than on many another, for marriage supported by the earnings of both parties offers many of those attractions which appeal to the temporary and immediate convenience of mankind to the prejudice of its permanent welfare. It is said, however, that otherwise these women would remain single; we must therefore consider what we should be losing by such a state of affairs. The note proceeds:—"Among wage-earning women those who have proved their efficiency by earning their living at skilled work are probably superior in energy and intellectual capacity to the remainder, and, as the excess of women over men makes it impossible for all women to marry, it is just those who should not be

¹ *Journal of Mental Science*, 1902, October.

prevented from so doing." The view advanced here can only be held by setting up precisely the same standard of fitness for women as for men, indeed by claiming that the eugenic excellence of a woman can be measured by her earning capacity, or by saying that in the arena of economic conflict and under the conditions in which men strive with one another, certain women who show up better than their sisters are in fact better *as women*. Would these same women prove superior under what we must regard as the true, though very different, standard of female fitness provided by home-life? We believe that they would not, for the sufficient reason that success in economic strife means excellence in qualities that on the whole have slight bearing upon home-life. If we follow the reasoning of the note, eugenists would do well to look for their wives among the ranks of economically successful women, since it is assumed that the level there is higher than elsewhere. This we hold to be an entirely false assumption. We may now consider the sort of man such a woman is likely to secure. It is clear that her professional success is only of advantage in securing a man who is willing to share a more pretentious home, in part supported by the woman, to a less pretentious one wholly supported by himself, using support to mean economically supported, and who is also willing to consent to the best part of the time and energies of his wife being used outside the home.

The eugenist is not concerned so much with unreasonable restrictions on marriage as with restrictions on eugenic marriage. To remove restrictions on one sort of marriage, for instance, that supported by the earnings of both parties, only makes it harder for the normal marriage to take place, for it raises the standard necessary and discourages what we regard as the eugenic marriage, where the spheres of man and woman are quite definite and where man is selected for one kind of excellence and woman for another. Since the *total* number of children born is controlled by the general economic condition of the country, discouragement of marriage in any one class will only result in a larger number of children to those marriages which do take place. Continual exposure to identical economic conditions is bound, in the long run (and as eugenists we are wedded to "long views"), to result in an approximation of type. The qualities for wage-earning being sexually neuter it is likely that all the finer female traits will be sacrificed to serve economic ends, for the emphasis of selection will be laid on those qualities which make woman economically successful. Civilisation makes ever increasing demands for specialised ability; it is therefore most wasteful not to make use of the one natural instance of specialisation provided by sex. The economic consideration in marriage is a bar to sexual selection, and it would be better to choose a wife uninfluenced by any prospect of economic assistance. It is from every point of view bad that women should marry late in life, an effect which, on the whole, would be entailed by professional and general economic efficiency. Both of these things would help to lower the eugenic standard. We can, of course, invoke the argument that the best people will always have sufficiently sound instincts to avoid such marriages, but custom and contemporary standards have great weight, and, what is far more serious, conditions would be so moulded as to make eugenic marriage increasingly difficult and they might reach such a stage that none but the wealthiest men could afford to dispense with the earnings of their wives. That this is not merely a pessimistic prophecy may be seen clearly in those industrial communities where the wages of the wife have long been indispensable to marriage. The growth of the factory system has made an almost equal demand for the labour of men and women. The employment of married women having been allowed to become customary, the wages given by the employer, determined by the minimum requirements of a working man's home, have shown a tendency to be divided between two persons instead of being given to one. The assumption that a man's wages ought to be sufficient to support a wife and family having

failed, any man desirous of establishing normal family life must either be able to earn nearly a double wage or be willing to live at a materially lower standard than his fellows. Nothing less than a radical change in the ideals of marriage has resulted from the employment of married women in this case and that change is clearly one for the worse. We do not disagree with the principle that a married woman, whose home is about to be broken up through misfortune, should be allowed if she can to restore its position by external economic effort, but such cases are and will be exceptional and in no society are there lacking such *occasional* facilities. Whilst in every way welcoming the widest possible education and outlook for women, always bearing in mind the inherently different standard of selection to be applied to the two sexes, we protest most strongly against the suggestion, implicit in the note, that the standards of selection for men and women should be allowed to approximate, as they surely will, under any long continued practice of marriage based upon the earnings of both parties.

R. A. FISHER.
C. S. STOCK.

REVIEWS OF RECENT BOOKS.

Douglas, SHOLTO O. G. *A Theory of Civilisation*. London. T. Fisher Unwin; 1914; pp. 246; price 5s.

MR. DOUGLAS'S theory is that the rise and fall of civilisations is a consequence of that of religions, or, as he calls them, "psychic illusions." These, being believed in, necessarily guided conduct (p. 13) in a superior manner, and "civilisation" (which is not defined) is the consequence of faith (p. 22). "From this it follows that the decay of faith leads to the decay of civilisation." This, however, is inevitable, because the increase of intelligent reflection leads to disillusion to and the decay of that which inspired the increase of civilisation (p. 25). The only gain would be "in the potentiality of increased intelligence, which, by heredity, would be existent in the brains of the men who composed the community" (*ib.*). The agency which selects the best "psychic illusion" and educates it to promote the upward development of man is "evolution," which is more than half personified. The rest of the book is taken up with interpretations of history which the author believes will support his theory. These do not, however, appear very plausible, and he hardly attempts to dispose even of the more obvious objections to his theory. Surely he is begging very large questions when he assumes that "evolution" is an agency which aims at progress, and that all religions are "illusions" with no truth in them. Moreover, they have not been the sole factors in what progress there has been, and indeed are apt in some ways to arrest progress, and to check civilisation. For being great conservative forces they not only tend to oppose timely changes, but conserve in their structure, like flies in amber, primitive ideas which would have been eliminated long before but for their religious associations. This explains, e.g., how the lofty piety of the Mexican hymns could co-exist in the same religion with the abominations of its human hecatombs. Altogether, Mr. Douglas's contention, though it is likely to be acceptable to Mr. Benjamin Kidd, seems calculated to infuriate the man of science.

F. C. S. S.

Fischer, DR. EUGEN. *Die Rehobother Bastards und das Bastardierungsproblem beim Menschen*. 1913; pp. 327; 19 plates.

IN the neighbourhood of Rehoboth, in the centre of German South-West Africa, there exists a population of some 2,500-3,000 souls who have sprung, during the last 100 or 150 years, from the unions between Boer farmers and Hottentot women and the intermarriage of their descendants. Probably no other community exists in which the laws of human inheritance can be so advantageously studied, the Hottentot is as unlike the Caucasian as possible, besides having traits which are shared by no other people except the Bushmen. Dr. Eugen Fischer, Professor of Anthropology at Freiburg, recognised the value of the evidence that might be collected among these (so-called) Bastards, and with the financial assistance of the Royal Academy of Sciences of Berlin, undertook a careful examination of the people. The volume, in which his results are recorded, is one of great interest and considerable importance, indeed, for the two races of which it treats, it may be considered to give in simple form an answer to the old question: What happens when two perfectly distinct races of mankind interbreed through a series of generations? Or, to put it in another way: Can diverse races fuse or amalgamate so as to produce a new race? Fifty, or even fifteen, years ago, the answer would probably have been in the affirmative, and no doubt there are anthropologists who take this view, but although it seems that in certain cases forms that are in a sense intermediate may arise by the crossing

of two races, the real question is whether such forms reproduce themselves indefinitely, or whether their offspring exhibit the characteristics of the parent races.

Professor Fischer has measured 164 Bastard men and women, whom he divides into European, Intermediate and Hottentot groups according to the amount of white blood present; as far as possible, he has given their genealogy in 23 tables at the end of this book, and has also reproduced a considerable number of their photographs. An examination of this evidence will probably convince any impartial reader that he is right in concluding that the Reheboth Bastards are a very variable group, the physical characters of the parent races occurring in the most manifold combinations, so that there can be no question of any new race with approximately uniform characters having arisen. Many traits are examined all leading to this conclusion, though some difficulty is presented by an observation of special interest; it has long been known that among plants certain crosses exceed in size both their parent stocks, while recently the writer has suggested that such "gigantism" is paralleled by the height of the Bahima—perhaps the tallest race in the world—the product (as far as is known) of the union of the short, slim Hamite and the moderately tall, "stocky" Negro. Now Dr. Fischer finds that the bastards are taller than either of the parent races. If this observation can be confirmed and extended it looks as if it supplied the key to the tall stature of many of the Bantu and half-Hamitic peoples of Africa.

On the psychical side the author records the increased intellectual variability and capacity of the Bastards as compared with the Herero, without any marked excess of the sterner virtues, the steadfastness and mental energy of the European, which are so often lacking in half-breeds, when, as in the present instance, one of the parent races is notoriously deficient in these respects.

C. G. SELIGMANN.

Lloyd, THOMAS. *The Making of the Roman People.* London: Longmans, Green and Co.; 1914; pp. 136; price 4s. 6d.

THIS is an interesting and able book by the senior editor of *The Statist*, but the reviewer is left in a doubtful mind as regards its value as a contribution to the solution of a very obscure problem, viz., the racial affinities of the original Roman people. Ethnology is a ticklish subject. There is very little assured information, and conflicting theories are numerous. If we ask any of the fundamental questions—e.g., what was the original home of the Aryans? What were the racial affinities of the dark-haired, dark-eyed, dolichocephalic race which inhabited the Mediterranean area at the dawn of history? Whence came the blond Nordic race which overspread Northern Europe? Who were the Gaels or Kelts, whence did they come, and how far did they permeate Western Europe?—no quite definite answer is possible. We know enough on these points to excite interest and stimulate further inquiry, but precise information is lacking. Mr. Lloyd makes the somewhat unfortunate suggestion that the Mediterranean Race should be henceforth called the Brown Race—a term which, to most readers, would suggest a Maori or a Polynesian. The Mediterranean race was, no doubt, dark-haired, and dark-eyed, with an olive complexion, but it was not brown-skinned.

Mr. Lloyd's central idea is that the original Roman race, those who constituted the Patricians of the historic era, were of Gaulish or Keltic origin, and that the Plebians belonged to the so-called Brown Race. He supports this thesis by many ingenious arguments, relying mainly upon the linguistic affinities of Gaelic and Latin. Many of the analogies which he quotes are striking and interesting, but some seem very far-fetched. As an example of the latter might be cited, his theory that the Latin word *bonus* (good) is derived from or related to the Gaelic word *ban* (white); and that the Latin *meliōr* (better) is similarly related to the Gaelic word

for honey, viz., *mil*. This seems very improbable. The original form of *bonus* was *duonus*, which does not fit Mr. Lloyd's theory, and *melior* is generally thought to be derived from the root of the Greek words *μαλα* and *μαλλον*. There are many derivations in this volume quite as fanciful as the above. What are we to say of such identifications as the following? :—Gaelic *bean* (woman) with *Ven-us*, Gaelic *luch* (mouse) with *lup-us*, Gaelic *crann* (tree) with *grand-is*. From analogies so remote it is difficult to draw any secure argument. Mr. Lloyd says:—"I produce the evidence to show that whoever brought the language into the Roman territory which, in the shape we know it, is called Latin, must have spoken a tongue practically identical with Gaelic." His arguments and analogies are worthy of the attention of philologists, but it is generally admitted by ethnologists that linguistic similarities are not altogether a trustworthy clue with which to unravel racial affinities.

J. A. LINDSAY.

Eames, BLANCHE. *Principles of Eugenics.* New York: Moffat, Yard and Co.; 1914; pp. 91; price 75 cents.

THIS little book aims at surveying the whole field of eugenics, and is entirely didactic in tone. The authoress has high ideals and writes with a fervour of moral enthusiasm which is deserving of respect. She is an enthusiastic believer in the possibility of regenerating humanity by the dissemination of a sound knowledge of the laws of sex hygiene, and she regards those laws as simple and obvious. The problems of heredity seem to her to admit of easy solution, and to involve moral principles which have only to be stated in order to be immediately acknowledged. Unfortunately, her science is somewhat amateurish. She is a firm believer in the doctrine of the transmission of acquired characters, and lays immense stress on the very doubtful theory of maternal impressions. She is nothing if not thoroughgoing in her proposals for reform. She is in favour of segregating all persons affected by venereal disease; looks approvingly upon the sterilisation of the unfit; would suppress the liquor traffic and forbid the use of tobacco as a pernicious race poison. Views of this kind are hardly practical.

J. A. LINDSAY.

Gallichan, WALTER M. *Women under Polygamy.* London: Holden and Hardingham; 1914; pp. 332; price 16s.

THIS book is of the scissors and pastepot type. The writer tells us he has set out to avoid both "enthusiastic approval and heated condemnation," and he leaves us to wander among opinions and the records of experiences, which he has culled without system from many sources. The ancient empires of the East, the time honoured observations of Herodotus, the literature of the Old Testament, the marriage customs of India, Burma, Turkey, Persia, Morocco, Japan, China and Utah are all passed in brief review, with many extracts from writers whose merits there is no attempt to estimate. Thus we are told (page 54) that "A. Goodrich Freer says that the children of Jewish Mohammedans are treated affectionately by their parents"; that (page 110) Mrs. Pechey Phipson, M.D., considers "a Hindoo girl of fifteen is about the equal of an English girl of eleven"; that (page 122) the Rev. Dr. Elliott declares "Mohammedanism is in its essence carnal"; that (page 160) Sir Edwin Pears writes "that the social evil is apparent in Constantinople"; that (page 210) Pinkerton "noted very little difference between Moslem and Christian marriage"; that (page 289) the Rev. Dr. Parkhurst "calculates there might be a quarter of a million" unfaithful wives and husbands in the City of New York; while (page 290) Max Nordau asserts, "from his observations of German life that men are naturally polygamous." And so on. Turning to the writings of well-known English men of letters, we learn that Oliver Goldsmith was a diligent investigator of oriental manners and customs; that William Cobbett noted the tendency of most men to rebel secretly against the limitations of conjugality; that Charles

Kingsley declared that there could never be a good world for women until the last remnant of canon law was destroyed; and that Thackeray was much impressed by the love of the Turkish people for their children.

It is difficult to understand for what class of readers such a volume is intended.

C. D. W.

Bulkley, M. E. *The Feeding of School Children.* London. G. Bell and Sons, Ltd.; 1914; pp. 278; price 3s. 6d.

THIS admirable book is published under the auspices of the Ratan Tata Foundation, and may be regarded as complementary to Mr. Greenwood's "Health and Physique of School Children," recently published under the same auspices. Miss Bulkley traces, in some detail, the history of the movement for providing school meals, from the earliest efforts of voluntary agencies to the Education (Provision of Meals) Act. The working of this Act is then described with great knowledge, and the following (among other) conclusions are reached:—

1. So long as economic conditions are what they are, the provision of school meals is a necessity. The Act should be obligatory upon local authorities where no adequate provision is made by voluntary agencies. The limitation of a halfpenny rate should be removed.

2. The children to be fed should not be selected solely on the poverty test, and the provision of meals should be better linked up with the school medical service.

3. The meals should be part of the school curriculum, and cleanliness and good manners should be taught. Where only one meal a day is provided, dinner is preferable to breakfast. The food should be prepared not by caterers, but by the local authority itself in consultation with the school medical officers.

4. Meals should be continued throughout the year and during holidays. (There is an impressive chart showing the average loss in weight of Bradford children during their holidays.)

5. Meals should be intended primarily for paying, and not for necessitous, children. Otherwise, parents who can pay will not send their children to any great extent.

6. Overlapping between the guardians and the education authorities can be avoided if the guardians give their out-relief partly in the form of school meals, and pay the education authority for these meals.

In a most interesting chapter on the Provision of Meals in London, Miss Bulkley describes the functions and the great opportunities of the Care Committee. "The Care Committee system represents, indeed, one of the most hopeful movements of the time, denoting, as it does, an awakening of the social conscience and a revolt against the old system of district visiting . . ." and she quotes some words of Mr. Marquis, of Liverpool, in which he sees in the Care Committee a means of turning the grumbling ratepayer into an enlightened and sympathetic critic of the education policy of his city. In the poorer districts of London the need for workers is very great, and the system ought to be more widely adopted in the provinces. There are chapters on the Extent and Causes of Mal-nutrition, and on the effect of the meals on the children, in which medical and other evidence is skilfully marshalled and leads Miss Bulkley to the conclusion that "as far as the children are concerned, whether we consider the improvement in physique, mental capacity or manners, there is no doubt that the provision of school meals has proved of the greatest benefit." An encouraging fact is that the school meals seem to improve the home meals, the children "acting as missionaries to their mothers." Now most of this the reader would have perhaps expected, and he will turn with special interest to the most controversial chapter, that on "The Effect on the Parents." In this Miss Bulkley deals faithfully with the "pauperisation" argument, and we have seldom read a more able discussion of the danger to the "solidarity of the family" alleged to lie generally in muni-

cipal enterprise and particularly in school meals. Miss Bulkley is strong both in theory and in experience, and though others equally strong may disagree with her defence of the meals, she deserves to make many converts.

A. COCKBURN.

Elderton, ETHEL M. *The Declining Birth-rate: Report on the English Birth-rate.* Part I., *England North of the Humber.* London. Dulau and Co.; 1914; price 9s. net; pp. 246.

So many of the works devoted to a discussion of the birth-rate are ill-constructed that the systematic plan of Miss Elderton's treatise at once commands the approval of any serious reader. In an introduction the nature and limitations of the material are described and methods for its analysis indicated, briefly, but in a sufficiently intelligible manner. Each of the registration counties of England north of the Humber is then passed in review and its constituent units studied in detail. In the case of each district the changes in the birth-rate are displayed both diagrammatically and with the help of statistical constants. In all cases a comparison is instituted between the actual birth-rate, in terms of married women at ages 15-55, and their potential fertility estimated by Tait's method; wherever possible, statistics of housing and industrial pursuits are furnished, while verbal accounts of local conditions have often been supplied by residents. In the final sections, the relation between the fall of the birth-rate on the one side and industrial and social variations on the other are examined with the help of the calculus of correlations, the last chapter setting forth the general conclusions to be drawn.

Any work planned on so large a scale and yet affording so much specialised information must be liable to attack at various points. One statistician may object that some measure of social conditions other than those adopted by the authoress would have been superior; another may dissent from the particular choice of constants; a third may hold that the influence of increasingly stringent registration in the earlier period (birth registration was not enforced *under penalty* until 1873) has not been enough emphasised, and so on. This sort of thing is the small change of criticism, and we desire to pass at once to Miss Elderton's general conclusions, only pausing to record our sense of the obligation under which all votaries of statistical science must labour in respect of her valuable and painstaking inquiry, the publication of which would have done credit to a Government department, and is worthy of still greater praise as the effort of a private worker.

Miss Elderton's first conclusion is that there has been an immense fall in the birth-rate of England north of the Humber, a fall only to a slight extent dependent upon changes in age constitution. We cannot suppose that anyone who has paid attention to Miss Elderton's work or to the publications of the General Register Office will dispute this conclusion, and need not enlarge upon its importance.

The second conclusion is that the fall is due not to any physiological decrease of fertility, but to widespread and nearly universal voluntary restriction.

This conclusion will also be accepted by a majority of students. So far as we know, Dr. John Browlee is the only statistician of the first rank who entertains a different opinion. Dr. Browlee rests his belief partly on certain general historico-statistical considerations and partly upon a particular study of Scottish data from which he infers that "the whole distribution of the birth-rate figures seems to disprove that any but natural causes are at work in the production of the change."¹

The evidence upon which Miss Elderton relies is first the information as to the employment of contra-conceptive devices supplied by certain of her correspondents, and secondly, the fact that the fall has, on the whole, been more marked among those classes or in those districts in

¹ Brownlee, Proc. Roy. Philosophical Soc. of Glasgow, April 29th, 1908.

which a higher standard of intelligence or living is found. Miss Elderton seems to think, an opinion which we share, that the former class of evidence is of doubtful value in establishing the extent, although it may be of weight in testifying to the existence of a custom. The second class of evidence is more cogent; if, as we think Dr. Brownlee holds, the declining birth-rate is part and parcel of some periodic variation of germinal vitality, it is singular that its manifestations should be so discriminating. We may be permitted briefly to refer to some attempts we have incidentally made to throw light upon the point, although they must appear trivial in comparison with those of Miss Elderton. If the declining birth-rate be artificial, then we ought to find that in districts which have, when we compare the first and last years of a long series, fallen equally far, those specially open to influences favouring artificial restriction should lead the way chronologically. We chose for comparison ten districts in the south-west of England and ten in Kent and Surrey, the latter being old-established outer suburban residential areas. From 1891 to 1911 the decline in the birth-rate was sensibly the same in the two samples, a fact which might appear to support Dr. Brownlee's view, since the social circumstances were very different in the two cases. But between 1881 and 1891 the decline proceeded twice as fast in the suburban sample as in the remote rural one. Such a result points, we think, to the gradual dissemination of a custom. We have not, however, been able to confirm this in all cases. For instance, the course of the decline in Norwich and Yarmouth, the only two large towns in Norfolk, has, since 1881, not differed markedly from that seen in the rest of the registration county. Another result which is strongly confirmatory of Miss Elderton's view is the remarkable difference between the state of affairs in Shoreditch, a typically poor, and Hampstead, a typically rich, London borough. We find that the birth-rate (corrected by Newsholme and Stevenson's method) in 1881 in Hampstead was 30·01, and in Shoreditch 31·32, no very great difference. In 1911 the figures were 17·55 and 30·16. The regression coefficient measuring the decline in Hampstead is six times as large as that of Shoreditch, being in the latter case hardly sensible. Similar results have, of course, been obtained in Berlin and other large cities, and we do not see how they can be interpreted except as consequences of artificial limitation.

Miss Elderton's next conclusion is that the decline has been associated both with increasing discussion and dissemination of means to prevent conception or destroy its fruits and with further restrictions upon the economic exploitation of children. In other words, prevention has become easier and the economic value of the child less. Lastly, Miss Elderton holds that the fall is differential in the sense that the ostensibly fitter parents have been precisely those who have limited the numbers of their offspring.

With respect to these two conclusions, we think that the former is fully substantiated both by the evidence Miss Elderton presents and that published by other members of the Galton Laboratory staff. The second conclusion also seems to us established in a general way. We think, indeed, that in some cases it is doubtful which is the cart and which the horse of the statistical equipage Miss Elderton drives. To take an illustration, we are told that the correlation between health of mother and size of family for constant age and employment is $-25 + 012$, but the fact that "health" is, to some extent, a heritable character, is not sufficient to prove that it is really the horse, it *might* be the cart. Perhaps the good health of mothers with small families is due to their having small families, it may not be that, *ab initio* healthy, they decide to bear few children; after all, child-bearing under unfavourable conditions is a fairly common source of ill-health. But this is a minor point; that, in a general way, Miss Elderton has established her case seems hardly doubtful.

This brings us to the practical applications Miss Elderton makes of her store of scientific results.

She thinks that the nation needs two small things and one great one. The two small things are repression of the sale of abortifacients and increasing police vigilance with regard to shops vending preventive appliances. The great thing is best described in her own words. "But the one great thing we want is a real statesman, a man who will see whether the present movement for the limitation of the family is inevitably leading the nation. We need a man who will grasp clearly the economic course of the whole evil, who is able to awake the nation and who, gaining its support, will make the well-born child again an economic asset. We want a leader who will convince the workers, both with the head and with the hand, that, however costly, the well-born child is now as it was in the past, the basis of national greatness and the price of empire; we need above all a statesman who will make this child once more a welcome possibility. He will have a task, such as only those can realise who have plumbed even the shallows of this swamp which is threatening to rise and engulf the nation."

We confess that this seems to us, as Bagshot would have put it, a trifling eloquent. There is a half suggestion, contained in the phrase beginning "however costly," that *even in the absence of economic relief* it is the duty of fit parents to pay "the price of empire." We would submit, by no means as a final argument, but still as one deserving refutation, the following reply which might, we fancy, be made by a Neo-Malthusian and shall look forward to the rejoinder which it may provoke.

If the price to be paid for the maintenance of English or even European predominance is a succession of thwarted lives among the many, that the few may prosper and revel in the vanity of leadership, the price is too high and the present order of society hardly worth preserving. We shall be told that this is unpatriotic; that all good men should be prepared to make sacrifices for the common weal. We cordially agree that patriotism is one of the high virtues and that for the sake of his country and her traditions a man should cheerfully lay down his own life. But we do not know that he is ethically justified in sacrificing the lives of others. One of our most penetrating psychologists, Nathaniel Hawthorne, in a novel, perhaps less studied than it deserves, showed how narrow is the boundary which divides public spirit from selfishness. "They have an idol to which they consecrate themselves high-priest, and deem it holy work to offer sacrifices of whatever is most precious, and never once seem to suspect—so cunning has the devil been with them—that this false deity, in whose iron features, immutigable to all the rest of mankind, they see only benignity and love, is but a spectrum of the very priest himself, projected upon the surrounding darkness. And the higher and purer the original object, and the more unselfishly it may have been taken up, the slighter is the probability that they can be led to recognise the process by which godlike benevolence has been debased into all-devouring egotism." It is vain to say that the sacrifices entailed in the rearing of a large family fall upon the parents exclusively; the children suffer at least as greatly. In the world in which we live, as distinguished from some collectivist or eugenist Utopia, a small family *can* be better clothed, fed and educated than a large one, and this is the central fact in the situation. Before an honest man devotes himself to the rearing of a large family, the members of which will, so far as he can see, all be destined to the same weary round of toil and the same limited opportunities he himself endured, he must be informed precisely what economic measures will be undertaken to secure the liberties of the coming race and must receive some guarantees that they will really be put into operation. He will not be stirred by rhetorical phrases such as "the price of empire," "race suicide," and the like. We have no doubt that the

Roman pontiffs exhorted the sibyl most eloquently to lower her price and enlarged upon the danger to the State involved in her exorbitant demands. Although our governing classes receive a classical education they have still not assimilated the teaching of that instructive fable, they still believe that catchwords are legal tender. M. GREENWOOD, JNR.

Mott, F. W., M.D., F.R.S. *Nature and Nurture in Mental Development.*

London : John Murray; 1914; pp. 151.; price 3s. 6d.

THIS small volume is an amplification of three Chadwick Trust lectures delivered by Dr. Mott, than whom no better man to treat this subject in a popular way could have been found. The author's chief life-work has been neuro-pathology on its mental and brain side, his experience in that department being corrected and enlarged by his position as a physician to a general hospital.

To write effectively on *Nature and Nurture*, social, educational, psychological and eugenic knowledge and interests are needed, as well as the purely medical qualifications, which Dr. Mott so eminently possesses. He modestly claims to throw "only a little ray of light" on his vast theme, but hopes that his book "may stimulate the reader to further enquiries regarding the respective parts played by environment and heredity in mental hygiene"—an end which will certainly be attained. Strictly speaking, there is not much new or original work in the book. Dr. Mott himself and others have trodden the same ground before. It is through the way things are put by the author that the public will be interested and impressed and a certain rousing of the public mind and conscience in regard to those questions will result.

Dr. Mott brings together and correlates the latest facts in regard to his subject, but he has found, as so many of us who have tried to get at the public in regard to scientific matters, that it is difficult to avoid the use of technical expressions that are unintelligible to even educated people. What could an ordinary reader of these lectures be expected to gather from these two sentences? "The neurone is a complex cell behaving like a living organism; it nourishes itself and is not nourished. Now the neurones forming the grey matter of the cortex are the most complex and latest developed ontogenetically and phylogenetically, consequently the germinal determinants of those cells are less fixed and stable, therefore more likely to undergo pathological mutations than other cells of the body under the influence of chronic poisoned conditions of the blood of the parents." These sentences express scientific facts, but what do they convey to the lay understanding? We do not say this to discourage Dr. Mott or other scientific educators, but to show lay readers the difficulties of their task. Dr. Mott first treats of mental hygiene from a physiological standpoint and the causes of mental deficiency. He goes on to speak of the "raw material of character" in relation to heredity and the inheritance of pathological and individual characters. The old question of the respective parts played by inheritance, nutrition, education and environment on the work and life of man and woman are discussed. Then come interesting psychological studies of Laura Bridgeman, Helen Keller and Marie Heurton, and what they teach in regard to mental development. What the author says about sleep, feeding, the association of eye and hand and the senses in education are all most practical. The fourteen pedigrees given by him, and the beautiful diagrams, will greatly instruct the ordinary reader; without them the book would not be of half as much value. The last subject treated by Dr. Mott is self-control, that king of all the mental faculties and prince of all the virtues, the general practice of which would revolutionise human society. A short account of the medical inspection of school children by Miss Agnes Mott forms an appendix to the book. The volume really endeavours to put in 151 pages what it would require many treatises to exhaust.

T. CLOUSTON.

Pearson, KARL and Jaederholm, GUSTAV A. *Mendelism and the Problem of Mental Defect. II. On the Continuity of Mental Defect.* (Questions of the Day and of the Fray. No. VIII. London. Dulau and Co.; 1914; pp. 47; price 1s. net.)

THIS pamphlet, which continues the discussion initiated by Dr. David Heron's "Criticism of Recent American Work," affords an agreeable contrast to its predecessor; not only is it more valuable as a positive contribution to knowledge, but the style, although not entirely free from acrimony, does not sin against the ordinary rules of good taste and good feeling.

The argument is based upon an examination of 261 "normal" children in the elementary schools of Stockholm and 301 "mentally defective" children in the "help classes" of the same city. The examination was conducted by means of a modified Binet-Simon series of tests.

The data are analysed with the help of modern statistical methods, and careful attention is devoted to the various sources of fallacy, some dependent upon the selection due to removal of abler children to higher schools, others upon the fact that, whereas by hypothesis the difference between the physical age and the mental age, as defined by the Binet-Simon tests, in normal children should on the average be zero for each age group, such a result is seldom attained in practice. The latter defect is allowed for by means of a correction based upon a regression equation connecting mental and physical age. Even in the uncorrected data it is seen that 64 per cent. of the "feeble-minded" children have grades of mental defect presented by cases of normal children. It is true that no single mentally defective child has a mental age equal to its physical age, but 54 per cent. of the normal children have mental ages inferior to their physical ages. In the case of the corrected data, it is found that 70·5 per cent. of normal children fall into the range of intelligence of the so-called mentally defective, while 60·5 per cent. of the latter have an intelligence comparable with that of some normal children. The authors accordingly think that there is no justification for regarding "feeble-mindedness" as a condition discontinuous with the varying intelligences of a normal population. In the concluding section the problem whether the mentally defective children could be regarded as the "tail" of a population within which intelligence conformed to the Gauss-Laplace type of distribution is examined, and the conclusion suggested by the statistical results is that the mentally defective population may be heterogeneous. In view of their findings, the authors hold that the suggestion made by, or on the authority of, American observers that "feeble mindedness" is a unit character in the Mendelian sense should be dismissed.

Messrs. Pearson and Jaederholm, in the course of their lucid discussion, themselves either definitely enunciate or implicitly suggest the criticisms to which their conclusions are subject.

To begin with a relatively unimportant one, they refer on p. 10 to the doubt some might feel as to the sufficiency of linear regression equations for the purpose in view. This doubt is somewhat strengthened by the diagrams on pp. 24-25, and we had the curiosity to test the linearity of the regression in the case of the second diagram on p. 25. Computation of the correlation ratio from the data in Table IV., p. 27, and application of the usual test, seem to indicate that the regression is not in fact linear; but this single result is certainly not sufficient to disprove the suggestion that the use of a linear relation may suffice for practical purposes.

A much more substantial objection might be based upon the trenchant criticism of the methods of selecting the members of the "help classes" which is given in Note 11, pp. 43, etc. It appears that a host of circumstances other than "mental defect" have weight in determining whether a child shall be transferred to a "help class." For instance, in crowded schools it may be much more difficult to organise such classes than in those with plenty of room. In view of these facts, a hostile critic might urge that the overlapping of the two sections of children in respect of

mental ability is not evidence for or against the assertion that "feeble-mindedness" is a discontinuous variation. But those who use this argument must consider whether a contrary opinion has been based upon evidence of a better kind.

Another point is that the authors insist upon the conclusion that a judgment as to whether a child requires special treatment is not in fact based purely upon a survey of intellectual characters, but that "these children form a group in which mental defect is very common, but which probably includes also other types of social or school inefficiency, due to traits only by courtesy classed under intelligence, although they may be psychical characteristics."

But this is surely what Dr. Davenport wished to convey in the remarks derisively commented on by Messrs. Pearson and Jaederholm at the beginning of their paper. Dialectically, the American authors are entitled to retort that Messrs. Pearson and Jaederholm are guilty of a *petitio principii*. They may assert that what they call "feeble-mindedness" is a complex, and that it is the complex which behaves as a Mendelian unit character. Let us try to make the point plain by a scholastic illustration. In some examinations a candidate is examined in, let us suppose, five subjects, if he gets less than 25 per cent. of the possible marks in any one subject he is rejected, and if he gets less than 40 per cent. in any two or more subjects he is also rejected. Consequently the failures will include some candidates who are quite up to the average in four of the subjects and very far below the average in one, and others who are somewhat below but not greatly below the average in several subjects. Statistical analysis would not reveal any discontinuity in respect of any subject between the passes and the failures, and in truth no discontinuity might really exist. But it might be said that the two classes were really discontinuous, that the "unit" organisation reveals itself equally by a relative high but still sub-normal efficiency in several directions or by a startling deficiency in any one direction. The basis of this "unfitness" might be unitary although its manifestations might be various. We have supposed that some such idea as this may have been at the back of the minds of those Mendelians who speak of masked segregation, but we have no pretensions to expound the true Mendelian faith, and very probably our attempt to provide arguments for the American workers will be repudiated by them. For our own part we have no sort of doubt that Messrs. Pearson and Jaederholm's plea for further patient analysis is one which should be heeded by practical eugenists.

M. G.

Torelle, ELLEN, M.A. *Plant and Animal Children: How they Grow.*
Published by D. C. Heath and Co., 3 Portsmouth Street, Kingsway, W.C.; price 2s 6d. net.

THE author of this little book recognises that the question of training children in the ethics of sex is receiving widespread attention. She realises that such instruction has its foundation in life phenomena, and that therefore, to be effective, it must be based upon an acquaintance with these life phenomena, an acquaintance which may be obtained by even very young children if they are familiarised with the life processes of plant and animal life. That much may be done, in fact, that the most effective basis may be founded, in connection with nature study at school, is an opinion expressed by many thinkers on this problem of sex-education. But the great difficulty is that simple knowledge of the processes by which life is transmitted from one generation to another is not readily available for teachers who would enlarge their teaching in this valuable way; it is to be found chiefly in the depths of scientific biological literature. And he who would inform himself on these scientific details finds himself overwhelmed with technical terms and impressed with the fact that a study of the reproductive processes of the simpler plants and the simpler animals is usually regarded as belonging to advanced biological work and not suitable for, not acceptable to, the young mind of the child.

It is here that the author finds her inspiration for her work. She has found in her own experience of teaching in the public elementary schools, that children not only enjoy a study of plant and animal life when it is dealt with progressively and is related to human life and its problems, but that they are thoroughly able to understand the subject matter of botany and zoology when it is couched in simple terms and phrases.

In this book, then, she embodies an account of "plant and animal children : how they grow," intending apparently that the book should serve as a reading book, or perhaps a simple text-book, for use in the elementary schools, and should supplement and fix in their minds knowledge which they have gained through a study of actual living specimens in class work.

This book should be very valuable in aiding the specialist teacher to garb his scientific facts in simple words and phrases; it should also be very useful to parents who would desire to help their children towards an understanding of sex matters.

The author, an American writer, has gained her experience in American schools; hence some of the types dealt with are not to be found in our country (though their relatives are) and some of the popular names given are not those in general use here. Although there are a few inaccuracies of comparative unimportance (e.g. the rose spoken of as a honey-bearing flower), the book, as a whole, is an exceedingly useful departure from the usual trend of nature study literature, and though it carefully includes the reproductive processes in its account of the various types, it does not confine its attention wholly to these processes; in fact, it is broad enough in scope to form an elementary introduction to horticultural and agricultural work.

N. MARCH.

Galloway, T. W., PH.D. *Biology of Sex for Parents and Teachers.*
Published by Geo Harrap and Co., 2 and 3, Portsmouth Street,
W.C.; price 2s.

In this small volume Dr Galloway gives a simple, concise account of many of the facts concerning sex, dealing with them from the biological point of view, utilising the biological illumination with considerable skill to make clear the natural, stimulating and upbuilding nature of the sex-factor. The aim of this treatment of the subject is not so much to supply information to be passed on to children as to give instructors themselves—parents and teachers—a correct view of sex and of the special relation of sex problems to child-life, so that they may be fitted to meet the demands which this phase of education may make. He recognises that sex-education may fall into the hands of parents during the years of childhood, of parents and teachers during the early school period, and may be effectively extended during the high school period. He suggests that parents and teachers themselves should be prepared. lectures for future parents and for future teachers should be given by experts in the colleges and training schools.

The Appendix is an attempt to help parents to meet the particular problems which may confront them in practical dealings with children, and very rightly emphasises the wisdom of preparedness. Mere knowledge, however, does not constitute a mainstay in face of social peril, nor will knowledge of facts alone serve to upbuild the moral framework. This the author realises to be a very important point, and he deals with the social and ethical aspects of sex-training, both in a special chapter and indirectly as the main inspiring thought running through the biologic theme.

This is a book which should be very useful to the intelligent thinker on these problems of education. It is singularly free from the diffuse wordiness, so characteristic of the literature of sex teaching, and by its very brevity and conciseness should prove to be a mental stimulant of

no small merit to those who are already aware of the social need. It is probably this habit of conciseness in statement which causes the chapter dealing with Eugenics to appear too abrupt and too definite in statement, for although the author, in dealing in a few paragraphs with hereditary transmission of taints, states that our knowledge is as yet very incomplete, he pronounces with a definiteness upon certain points which does not indicate the present vagueness of our information. This is a tendency somewhat characteristic of American literature on sex-education. Qualifying one's remarks, however, with this caution, one has no hesitation in recommending this book as an aid towards instruction of parents, teachers and social workers.

N. MARCH.

Marett, MR. R. R. *The Threshold of Religion.* London · Methuen and Co., Ltd.; price 5s. net; pp. 220.

MR. MARETT's work is of interest to eugenists, for he places anthropology as a branch of biology, and the one that is likely to bring us to the true meaning of life. This book is a new issue, with additional chapters. It is made up of papers and addresses bearing on the nature and experience of rudimentary religion. The primordial category of religion is held to consist in the notion of power rather than in the notion of spirit. Several positions advanced by Dr. Tylor, Dr. Frazer and Mr. Lang are acutely criticised. Some very interesting things are said respecting *Tabu*, *Mana*, and the *Bullroarer*. *Tabu* is regarded as the negative side of the supernatural to which *Mana* corresponds as the positive side. The *Bullroarer* is "perhaps the most ancient, widely spread and sacred religious symbol in the world."

Very suggestive and original is the chapter "The Birth of Humility." The volume closes with a fascinating account of a visit to the caverns of Niaux and Gargas. "The spirit of awe and mystery still broods in these dark galleries within a mountain, that are to a modern mind symbolic of nothing so much as of the dim subliminal recesses of the human soul."

J. B.

PERIODICAL LITERATURE.

ENGLISH.

JOURNAL ROYAL STATISTICAL SOCIETY, June, lxxvii, 1914 Pp 705. *Suggestions for Recording the Life History and Family Connections of every Individual*, by Walter Hazell. The author proposes that each individual should be provided with two numbers, that of the registration district in which his birth occurred and an individual number. These two numbers are to be produced by him throughout life whenever a record of marriage or birth is made, and also to appear upon his death certificate. A life card for each person born will be preserved at the general register office, and, with the help of the system of personal numbers, entries of important occurrences throughout his life will be made, as they are reported, upon his life card. The idea is that an interested party, for instance, an intending bride or bridegroom, armed with the numbers could, from the life card, glean particulars of importance, the degree of information available depending upon the minuteness with which the system was carried out. Mr. Hazell justly remarks in favour of his scheme that :—"First, it would tend to raise the life records of men to the level already attained by pedigree animals. This is not sarcasm, as I observe with some shame that we seem to care less for the family history of a man than that of a beast." Mr. Hazell's paper, which was read at the June meeting of the Royal Statistical Society, provoked a lively discussion, to which the Registrar-General and several other official statisticians contributed. Some of the

speakers doubted whether the system would be as useful as the author believed, but the general opinion was clearly favourable to the principle of Mr. Hazell's method, although those most conversant with the practical aspects of registration thought that he had under-estimated the practical difficulties involved. We are sure that all eugenists will heartily endorse Mr. Hazell's plea for a more convenient and accurate system of records, even if they admit, as they probably will, that the obstacles to be surmounted in practice are indeed formidable.

M. G.

THE JOURNAL OF GENETICS for October (Vol. iv., No. 2) contains two chief papers. Miss M. Wheldale writes on "Our present knowledge of the Chemistry of the Mendelian Factors for Flower-colour." A good deal of her paper deals with somewhat technical chemistry, but the conclusions arrived at are of great interest to students of genetics. Considering chiefly the pigments of the Snapdragon (*Antirrhinum*), she shows that the white, ivory and yellow varieties contain no anthocyanin, but that the ivory has one flavone and the yellow a second in addition. The white contains no flavone, but when either yellow or ivory is crossed with certain whites, the F₁ generation bears anthocyanin. This suggests that anthocyanin is formed by a modification of flavone. Two anthocyanins have been isolated from the Snapdragon, both of which contain a higher percentage of oxygen than the flavones, and the magenta anthocyanin, which is dominant over the red, contains more oxygen than the red. Evidence is given that the anthocyanin molecules are considerably larger than those of the flavones, and hence anthocyanin is not produced by mere oxidation of flavone, but by some sort of condensation in addition. The results obtained by several other workers in anthocyanins are discussed, and elsewhere in the current number of the journal Dr. A. E. Everest makes some criticisms of Miss Wheldale's previous work on the subject.

In the second paper Mr. C. Dobell writes on "The Genetics of the Ciliate Protozoa." His article is a general review of our knowledge of the life-history of these animals; he describes the earlier work and conclusions of Maupas, then the results of later investigations by Calkins, Hertwig, Jennings, Woodruff, Popoff, and others, and finally discusses the various conclusions which have been drawn. He concludes that many of the problems associated with Ciliates do not exist in Nature, and that they have largely arisen from the erroneous deduction that the Ciliate body is comparable with a Metazoan "cell." The hypothesis, for example, that the "purpose" of conjugation is to cause rejuvenescence and to avoid senility has been shown to be devoid of foundation, and with the disappearance of this belief the way is cleared for a study of many other problems arising from Protozoan life-histories which have hitherto been obscured by the assumption that "the Protozoa are the simplest organisms in which to study the great problems of biology." There is a good deal in Mr. Dobell's memoir with which biologists of various schools may disagree, but it is excellent, not only as a presentation of our knowledge of the subject in a fairly small space, but also as showing the inadequacy of many beliefs which have been widely accepted, and the need for further investigation unprejudiced by preconceived ideas.

L DONCASTER.

CHARITY ORGANISATION REVIEW, November, 1914. Vol. xxxvi. (new series), No. 215. *Notes on Social Work Abroad—Germany* (continued). Pp. 344-346. These notes afford information on the following subjects:—"Women as Relief Officials"; "The *Cecilienhilfe* Association," whose object is "to protect needy families and individuals, for whom the State and the Poor Law cannot adequately provide, against moral and social ruin"; "Thrift and National Insurance." An important step is the arrangement arrived at between the Berlin sanitary authorities and the women's benevolent organisations, under which members of the latter will attend the clinics and ascertain whether patients require help for their families or themselves on leaving a hospital.

THE PARENTS' REVIEW, December, 1914. Vol. xxv., No. 12. *School Clinics* (Part II.), by Leslie Kingsford, M.D., School Medical Officer, Liverpool. The author continues his explanation of the administration and organisation of a school clinic. The departments of a clinic are like those of the out-patient department of a large hospital. His opinion is that, in order to be run efficiently, clinics must be organised as one piece of machinery with the other branches of the school medical service, and efficiency will be more easily secured in a clinic run by the local education authority than in one organised by local effort as a voluntary clinic. An important feature is the possibility of co-ordinating, in many instances, the work of the clinic with the school and the home. An important consideration is the educational possibilities for parents and children of the clinic.

CHILD STUDY, October and November, 1914. Vol. vii., Nos. 6 and 7. *Intensive Child Culture*. In this presidential address, delivered in Edinburgh on June 5th, Sir James Crichton-Browne refers at length to the important service that phrenology, under the guidance of Combe, rendered to education by insisting on the principle that in order to raise any of our mental powers into free and healthful action it is necessary to bring it within the immediate influence of the members to which it is specially related. The lecturer is of opinion that correlation of brain-growth and mind-growth will afford the best guidance in child study, and suggests that:—“A study of the convolutions in the lower animals, and in human beings, healthy or mentally defective and diseased, will no doubt ultimately furnish valuable information; but I cannot think that a study of their hereditary resemblances in persons of the same family will yield results in any degree commensurate with the immense labour it must entail. . . . Much more urgent and significant, it seems to me, is the study of the order of appearance of the convolutions and fissures on the surface of the brain in the young animal and in the young human being, and the correlation of their appearance with first functional manifestations. . . . The period of youth is the period of brain growth, and the important point to note in connection with brain growth is that it is gradually diminishing in quantity as life goes on. At first very rapid, it steadily slows down. The convolutional eruption in the foetus is prodigious, in the baby luxuriant, in the child moderate, and in the adolescent imperceptible. And the same is it with psychological development; that is a steadily diminishing quantity as life goes on. It has been truly said that the first moment of existence is the most instructive of any, and that the older we grow the less do we learn.”

The second part of the address appears in the November issue of the journal, the subjects considered being the *Mental Evolution of the Child* during the first eight months of separate existence and the *Direction of Child Growth*. Under the last head the lecturer gives an account of the attempts to promote child growth by means of electrification. The results, in the opinion of the Professor Arrhenius, who conveyed the information personally, being negative.

Binet's Mental Tests, vi. (continued), by Mr. H. Winch, M.A. In dealing with series of tests for seven-year-old children the author compares the aptitude of English and French children of similar age groups. Test I. is to decide the child's capacity to perceive intentional omissions in drawings of the human figure. As the result of tests made with groups of English children ranging from four to seven years of age, the author considers that English children are so far in advance that in English schools the test should be applied in the case of five-year-old groups. Test II., to decide the child's knowledge of numbers. The author considers that in the case of English children the test should be applied for six-year-old groups, and not seven-year-old groups, as with French

children. Test III., to decide the child's power to copy a phrase of three words in script. Here again the decision is that the test is suitable for six-year-old groups in English schools. Test IV. is concerned with ability to draw a *losange*. In this instance the author decides that the test is applicable to English children of the seven-year-old group. The French tests being made with pen and ink, English tests were also made in this way, but Mr. Winch is emphatically of opinion that the test should be made with pencils.

A further continuation appears in the November number. Test V., for seven-year-old children, viz., repeating five numerals, not in consecutive order, e.g., 7, 3, 1, 4, 9. The author states his preference for unassociated consonants, owing to possibility of greater variation. This test is considered suitable for seven-year-old groups, as in the case of French children. Test VI., the description of a picture. In this instance the author considers the test adapted for five and six-year-old groups in English schools. Test VII., counting test. In this test a marked difference was apparent in the capacity of English and French children. In the English schools 86 per cent. of the children in the five-year-old group passed satisfactorily. Test VIII., naming pieces of money. The result of this test induced the author to regard it as more suitable for children of the eight-year-old group in the case of English scholars.

Parent Educators, by Professor Bidart. VIII. and IX. *Rebukes and Punishments: Improper Methods*. Translated by Miss M. S. Ryan, B.A. Pp. 106-109. The author advocates the advisability of cherishing the child's feeling of honour, delicacy of conscience being regarded as the moral safeguard of child and adult. Instances of mischievous forms of reprimand frequently employed, and their effect, are given. "Public" reprimand is especially discouraged. The author considers that a child will generally discover, by the expression of the parent, the fact that his conduct is displeasing, and the effect of sparing him censure in public will be to cause regret for his misbehaviour. Humiliation of a child is likely to lower his self-respect and prove discouraging.

Methods of Rendering Punishment Effective and Infrequent. Pp. 126-128. In this paper the same author points out that the efforts of the parents should be the *prevention of disobedience, and the prevention of serious faults*. "Every fault," says Théry, "has its external symptoms, its particular expression. Obstinacy shows itself in the mulish look, anger in the flushed countenance, jealousy in the livid hue." These external signs, easily perceived because children do not know how to dissimulate, should be noted by the parent and dealt with according to circumstances. Anger should be checked, in other cases an appeal should be made to the child's goodwill. The author considers the best warning is that which is uttered quietly and calmly "If you continue to do that you will make me angry." The appeal is thus made to filial affection instead of to fear. If a child wilfully disobeys, he should be punished, but it is the *disobedience* that should be punished, not the *consequence* of it.

MAN, November, 1914 Vol. xiv, No. 11. *Physical Anthropology—On the Differentiation of Man from the Anthropoids*. By Professor Carveth Read, M.A. Pp. 181-186. In this paper, which was originally read at the meeting of the British Association at Birmingham in September, 1913, the author, basing his remarks upon the hypothesis that the differentiation of man from his nearest relatives may be traced to the influence of one variation operating amidst the original anthropoid conditions, viz., the adoption of a flesh diet and the habits of a hunter in order to obtain it, aims at elucidating all the chief features that mark this distinction.

He divides these features into (*a*) those of habit and function, and *b*) those of structure, and instances the following, amongst others:—

(*a*) "The carnivorous habit explains the adaptation of our species to a ground life and to a world-wide diffusion. For this can have happened only to an ape that found its food chiefly on the ground and was no longer dependent on the fruits and highly nutritious vegetable products of the tropical forests. And this would be possible only to one that had either become carnivorous or else had taken to a coarser diet of roots and herbage such as the ungulates. That our species ever adopted the latter alternative there is not the slightest evidence. Had it done so our alimentary canal would probably have lengthened. (2) That the earliest known men were hunters, and that the earliest known artefacts are weapons, agrees with our hypothesis. Any other hypothesis must explain how they came to be so. (3) Man alone of the higher primates is social and co-operative. The gibbon, indeed, may be called social but hardly co-operative. Baboons seem to go furthest in co-operation. The most backward men are most co-operative in hunting, war and tribal ceremonies. . . . It cannot indeed be supposed that man began by attacking big game without weapons; and it would be absurd to suppose that he first invented weapons and then attacked his prey. This is psychologically impossible. (4) Man has lost the restraint of seasonal marriage (common to the gorilla and orang, with other animals, as determined by food supply and other conditions of infantile welfare); though according to Westermarck, traces of it survive in a few tribes. That our domestic carnivores have also lost this restraint points probably to some condition of steadier food supply as determining or permitting such a change in ourselves. (5) Articulate speech may confidently be traced to social co-operation; since, had family life been sufficient for its development, the chimpanzee and gorilla should have talked; or if social life merely, the gibbon; for he, the most social, is also the most vocal of the anthropoids. (6) Wrought weapons imply the use of tools and the development of the constructive instinct. (7) The production of fire by the flaking of flints or the rubbing of sticks together may easily have been discovered in the making of weapons. (8) He must have learned to discriminate all sorts of animals; their reactions to himself, manner of flight, attack, or defence. . . . He must have adapted his weapons to his prey.

"(*b*) Structural differences. (1) The changes involved in the erect gait (imperfectly attained by the gibbon) as the normal mode of progression—namely, the modification of the vertebral column, the balancing of the head upon a relatively slender neck, changes in the joints, bones and muscles of the legs, the lengthening of the legs and the specialisation of the foot, in which the heel is developed more than in the gorilla, and the great toe lies parallel with the other toes. (2) The specialisation of the legs and feet, as it proceeded, made possible the specialisation of the hands. (3) The reduction of the arms in length and massiveness may be explained by (*a*) physiological compensation for the growth of the legs, (*b*) mechanical compensation by the use of weapons, (*c*) lessening of the weight of the body, and the improving of the balance and agility of a runner. (4) The shortening of the muzzle. (5) At the same time the skull increased in capacity to make room for the brains of an animal that acquired much knowledge (parietal association area) and lived by the application of its knowledge to the co-ordination of its very complex activities (anterior association area), including language (Broca's convolution). (6) Deals with the alimentary canal. (7) There is one characteristic difference of man from the anthropoids of which the carnivorous habit of man affords no satisfactory explanation—his relatively naked skin."

FOREIGN.

POPULAR SCIENCE MONTHLY, November, 1914. Vol. lxxxv., No. 5
Science and the War. Pp. 516. In this editorial it is pointed out that one of the most serious aspects of the war is the diversion from scientific work which it involves. It is estimated that if the contributions to pure and applied science in the course of the next ten years be reduced by one-half, the loss to the world in life and wealth would exceed that caused directly by the destruction of war. "The death-rate in England has been reduced from 23 per thousand to 14 per thousand in the course of 50 years. If by the advances of science and civilisation in the course of ten years the death-rate would have been reduced to 11 per thousand, and as the result of the war the reduction should be only to 12, so that for a period of ten years the death-rate is 1 per thousand larger than it otherwise would have been, the deaths in England chargeable to the war, apart from those directly caused by it, would be in the neighbourhood of 400,000, and in the civilised world 4,000,000. There would be a corresponding excess of ill-health and disease over what would have been suffered had there been no war."

The Distribution of Scientific Men among the Different Nations. In an interesting editorial note this comparison is dealt with from various standpoints. It is first pointed out that approximately the numbers of scientific men of some distinction in different continental countries are as follows:—Germany, 1,280; France, 423; Austria-Hungary, 236; Italy, 215; Switzerland, 214; Holland, 155; Sweden, 109; Russia, 97; Denmark, 94; Belgium, 90; Norway, 98; Portugal, 49; Spain, 41. Basing the comparison on population the numbers of scientific men per million for those countries is as follows:—Switzerland, 58; Norway, 37; Denmark, 34; Holland, 26; Sweden, 20; Germany, 19; Belgium, 12; France, 11; Portugal, 9; Italy, 6; Austria-Hungary, 5; Spain, 2; Russia, 1. Taking the scientific men who were members of at least two foreign academies, the distribution is as follows (Dr. E. C. Pickering, 1908):—Germany, 29; France, 12; England, 13; United States, 6; Austria, 4; Italy, Sweden, Holland, Denmark and Russia, 3 each. The present distribution of the foreign members of the National Academy of Science is as follows.—Germany, 18; Great Britain, 11; France, 4; Holland, 4; Russia and Sweden, 2 each; Austria, Italy, Norway and Switzerland, 1 each.

The Ultra-Scientific School, by B. Horowitz (the College of the City of New York) Pp. 463-466. The aim of this school, at the head of which are Loch and Schäfer, is to bring the phenomena of life within the category of established laws—to regulate forces. To understand them is, they consider, beyond their power. The origin of their ideas they trace chiefly to Huxley. The author says: "Let it at once be stated clearly and emphatically that the ultra-scientific view is based primarily upon analogy—a very valuable method provided it is not carried to excess, and provided also that sufficient experimental data are at hand. . . . It is this argument by analogy that has led the ultra-scientific school to its present theory with regard to the origin of life. Lightly brushing aside the meteoric theories of Kelvin, Helmholtz and Arrhenius as irrelevant in so far as origin goes—for in their attempt to explain the first sign of life on this planet they presuppose the existence of the germ elsewhere—Schäfer boldly upholds the hypothesis that life originated as the result of the gradual evolution of inanimate material. In process of time the simple substance became more and more complex and ultimately emerged as the living germ—the nitrogenous colloid. But Schäfer goes a step further. Why are we to suppose that this happened but once, as all theories with regard to origin have thus far assumed? Why are we to suppose that at one time in the dim past a series of fortunate accidents made life possible? Is it not more logical to assume that these evolutionary processes are going on to-day?"

In his summary the author remarks. "At present we know of no better way of pursuing our search than through the sciences. But here we are only safe when we apply them to the things we can grasp."

Civilisation as a Selective Agency. By Roland Hugins, Cornell University Pp. 476-486. It has been generally agreed that little, if any, improvement of civilised man has occurred through selection. It is recognised that many selective forces, whether favourable or deleterious, have acted on the human race, but it cannot be asserted that there has been in operation any constant and effective agency likely to bring about marked advances in moral and intellectual qualities. Except among thinkers who cling to the Lamarckian doctrine, it is generally accepted that our inheritance is primitive inheritance, but it must be admitted that the twentieth century, with its vast philanthropies and its insistence on the ideal of service, differs from the hard life of the Greek and Latin cities, with their indifference to human pain and the rights of the weaker. The author offers two possible views for the different moral complexions of the ancient and modern world. "First we may accept the orthodox dictum, and maintain that any apparent changes are due to the increased weight, so to speak, of the race's moral heritage—to strengthened social controls and the ascendancy of new ethical types; or, secondly, we may postulate a change in man's innate moral nature accompanying and reinforcing the influence of the augmented social heritage. We shall be justified in pursuing the second, and bolder, course only if we can discern some selective agency adequate to effect the change. It is here suggested that such a selective agency can be discerned as operative; an agency at once powerful, comprehensive and continuous. We may denominate it the *elimination of the anti-social*—that is, the constant cutting-off of those elements in society which do not fit in with the requirements of orderly civilised life. The forms that this process has taken . . . have been many and diverse; but the result has been unified and focussed. Life in a settled community creates an environment of its own, imposing new standards of 'fitness'."

"Selection has had an almost infinite variety of human material to work on—all sorts of combinations between intellectual powers and moral excellencies. What selection has apparently done, through those agencies we have denominated the elimination of the anti-social, is to knock apart the two sets of endowments, and to recombine them in ways which give us, speaking broadly, a general average of greater moral stability linked with lesser innate talent. Civilisation, in bending human nature to its wheel, has softened it, and at the same time crushed out some of its virgin vigour."

POPULAR SCIENCE MONTHLY, November, 1914. Edited by J. McKeen Cattell. Vol. Ixxv, No. 5. *Phenomena of Inheritance*. By Professor Edwin Grant Conklin, Princeton University. II. *Modification and Extension of Mendelian Principles.* I. Under the head *Principles of Unit Characters and Inheritance Factors*, the author deals with "inheritance factors and germinal units." Regarding the principle of unit characters there has been a good deal of criticism. It is contended that unit characters cannot be independent and discrete things. The author asserts, however, that "for every inherited character there must have been a germinal cause in the fertilised egg," in fact a determiner of character. He continues "It is evident that there is not an exact one-to-one correspondence of inheritance units and adult characters. Many characters may be decided by a single unit or factor; for example, all the numerous secondary sexual characters which distinguish males from females are decided by the original factor, which determines whether the germ cells shall be ova or spermatozoa. On the other hand, two or more factors may be concerned in the production of a single character. In many cases,

among both animals and plants, the development of colour appears to depend upon the presence in the germ cells and the co-operation in development of at least two factors, viz., (1) a pigment factor P (for black B, for brown Br., for yellow Y, for red R, etc.), and (2) a colour developer C. When both of these factors are present colour develops; when either one is absent no colour appears. Castle found that eight different factors may be involved in producing the coat colours of rabbits; these are C, a common colour factor necessary to produce any colour; B, a factor acting on C to produce black; Br., a factor acting on C to produce brown; Y, a factor acting on C to produce yellow; I, a factor which produces intensity of colour; U, a factor which determines uniformity of colour; H, a factor for *agouti*, or wild gray pattern, in which the tip of every hair is black, below which is a band of yellow, while the basal part of the hair is gray; E, a factor for the extension of black or brown, but not of yellow. Plate found that all of these factors, except the last (E), are also involved in the production of the coat colours of mice."

2. Under the head *Modifications of the Principle of Dominance*, the author deals with "Sex and Sex-limited Inheritance" and "Sex-linked Inheritance".

3. Under the head *The Principle of Segregation* he deals with "Blending Inheritance".

III *Mendelian Inheritance in Man*. The author points out that the study of human inheritance is necessarily less satisfactory and conclusive than in the case of lower animals because of the lack of "pure lines". Naturally, experiments are out of the question—observation and statistics must be relied on. Whereas the Christian era represents but sixty generations of man, as many generations of *Paramecium* have been obtained by Jennings in two months. Another difficulty is presented by the limitation of human offspring, which renders it difficult to determine the hereditary possibilities of a family. Sixty human traits have been catalogued by Davenport and Plate which seem to be inherited in Mendelian fashion. Of these about fifty represent pathological or teratological conditions, and but a small number represent normal conditions.

The author brings forward numerous instances from leading authorities and concludes his article "By means of these principles (Mendel's principles) the hereditary constitution of organisms can be analysed and the real resemblances and differences of various organisms determined. The once mysterious and apparently capricious phenomena of prepotency, atavism and reversion find a satisfactory explanation."

Recent Mathematical Activities, by Professor G A Miller (University of Illinois). In the field of mathematics the most important achievement of present times is the memoir of the Spanish mathematical astronomer, Karl F Sundman, on the problem of three bodies. For this the Paris Academy of Sciences have recently awarded him the Pontécoulant prize, his work being considered epoch-making for analysis and for mathematical astronomy. Further, to mark their great appreciation of his achievements, the Academy doubled the usual value of the prize. For development in the theory of analytic functions during the meeting of the Sixth International Mathematical Congress, to be held at Stockholm in 1916, the King of Sweden has offered a prize of a gold medal and three thousand crowns (about £160). The author points out that, while prizes have stimulated research activity in mathematics, the main stimulus has been the opportunities afforded by various journals to make interesting discoveries promptly known. He refers to the monumental work being published in French and German which, begun in 1898, now approximates twenty large volumes of 500 pages each. This naturally raises the question whether such a work can fulfill one of the main objects in view, viz., provide the means of ascertaining rapidly what has been accomplished in a particular line.

Information of great value is being accumulated at the present time under the direction of the "International Commission on the Teaching of Mathematics," instituted at Rome in April, 1908. Meetings have been held for the discussion of fundamental questions relating to mathematical instructions. That at Paris this year was for the consideration of (1) the results obtained by the introduction of the differential calculus in the advanced classes of secondary schools, (2) the place and rôle of mathematics in higher technical education.

The author remarks that "mathematics is a network formed by intersecting thought roads, and the chief aim of the International Commission on the Teaching of Mathematics is to secure extensive information as regards the choice of roads in various nations." He also points out that "a considerable number of mathematicians are interested in constructing unusually attractive toll roads, especially in those regions where travellers are most abundant. Whether the prospect of tolls derived from small royalties constitute the best means to secure improvements in our elementary text-books, and whether this system is apt to continue to be efficient are questions which present many difficulties. There appears to be an enormous waste along this line at present, resulting from unfruitful duplication."

In conclusion, he remarks "As mathematics is such an old science, the educator naturally looks to its activities with a view to predicting in some measure the future activities of the younger sciences. Hence it is especially interesting to note those activities which imply vigour and promise for still greater achievements in the mathematical sciences."

CHICAGO MEDICAL RECORDER, November, 1914 Vol xxxvi, No 11
The Relationship between Epilepsy and Migraine Meyer Solomon, M D
 Pp 627-8. There has been a good deal of proof of the clinical resemblance and the clinical relationship of the two syndromes epilepsy and migraine. Dr. George A. Waterman, of Boston, has collected evidence on both sides and has also accumulated the opinions of various authorities in neurology. Turner and Ulrich report relationship in a number of cases between epilepsy and migraine, and Spratling, Spiller, Flateau, Parry, Price and others seem to accord with these ideas. Gower, Hubbell, Strohmayer and Moebius are opposed.

As proof of the clinical relationship between migraine and epilepsy Waterman states that "(1) there may be an exchange of one disease for another in different generations of the same family; (2) migraine may occur in early life, epilepsy superseding later, with the disappearance or diminution of the severity of the migraine and at times with the same aura for the later epilepsy as for the earlier migraine; (3) patients whose epilepsy has been cured by bromide treatment may later develop migrainous attacks; (4) in migraine attacks in certain individuals symptoms of epilepsy may occur."

The First Jury of Medical Women in the World's History Pp 637-8
 In October six women doctors were summoned to act as jurors in the Court for the insane at the Psychopathic Hospital before the County Judge, and returned verdicts in 22 cases. This is the first instance of a jury of medical women ever recorded.

Tuberculosis Meeting P 639 The fourteenth meeting of the Robert Koch Society for the Study of Tuberculosis, affiliated with the Chicago Tuberculosis Institute, was held on October 29th, the topic of the meeting being "Tuberculosis of the Larynx."

The Second General Tuberculosis Conference under the auspices of the Chicago Tuberculosis Institute was held on November 12th, when the following papers were read "Co-operation of the Visiting Nurses," "The Work of the Municipal Tuberculosis Nurse," "Co-operation of School Nurses."

THE CHICAGO MEDICAL RECORDER, October, 1914. Vol. xxxvi., No. 10. *Research v. Custody—The Case of the Friends of the Insane*, by Bayard Holmes, M.D. (pp. 546-550). In this address, given at the State Conference of Charities and Correction, Racine, Wis., on October 1st, Dr. Holmes pleads for the establishment of an institute of psychiatry for Wisconsin, one of the functions being research into the cause and cure of insanity.

A Federal Department of Public Health (pp. 568-9). An account of a movement initiated in *The Southern Medical Journal* to establish a central authority to undertake the work now carried out by the separate State Boards of Health at considerable expense. The name of Surgeon-General Gorgas is coupled with the proposal.

THE JOURNAL OF HEREDITY, November, 1914. Vol. v., No. 11. *Aryan Agriculture*, by Privatdozent Dr. Dettweiler, Inspector of Animal Husbandry, Rostock, Mecklenburg. (A slightly abridged translation of an address delivered before the Dozentenverein, October 9th, 1912.) (Pp. 473-481.) The conclusions arrived at by the lecturer are that, the most important plant and animal products of Europe are indigenous; wheat and barley were cultivated more than 50,000 years ago. On the authority of Braungart, he holds that the Indo-Germans possessed, at least 10,000 years ago, a well-developed art of agriculture; the horse was the latest of the important animals to be domesticated; the plough is of neolithic origin. The author assumes that the original home of the Indo-Germans was not Asia, but Northern Europe, where their culture was developed in the late Stone Age, before their dispersal, and is therefore of greater antiquity than that of Babylon or Egypt.

Coat Colour in Horses, by W. S. Anderson, Assistant in Horse Husbandry, Kentucky Agricultural Experiment Station, Lexington (pp. 482-488). The conclusions arrived at are based on a tabulation of colour of 42,165 horses. The author deals with errors in registry and in the genetic description of colours; and on the connection between gray and roan. The dominant colours are given as gray, roan and dun; and in mating bay is dominant to black; black is dominant to chestnut, the latter being recessive to all the others.

Albinism in Man, by A. E. Hamilton, of the Eugenics Record Office, Cold Spring Harbour, Long Island, New York (pp. 489-491). A review of the Pearson-Usher-Nettleship monograph, etc.

The Laws of Naudin Mendel, by Dr. E. Apert, of the Paris hospitals (pp. 492-8). Mainly devoted to a statistical discussion of the Galton Laboratory monograph on albinism. The author thinks the figures show that albinism in man is a Mendelian recessive.

Origin of the Date Palm, by the Editor (pp. 498-508). In this article the Editor, dealing with the discovery of fossil seeds of the date palm in the tertiary deposits of Texas, points to the possibility that it may be native to America. Reference is made to the fact that there are no less than 5,000 named varieties in the sub-tropical regions of the world, and to the connection of the date palm with the Semites, and its religious importance. Also to its influence as a factor of natural selection.

Study of Old Americans, by Dr. Alex Hrdlicka, Curator, Division of Physical Anthropology, U.S. Nat. Museum, Washington, D.C. (p. 509). The author describes the means that are being taken to record for future comparison the measurements of "Old White Americans," i.e. descendants of American parentage on both father's and mother's side for at least three generations.

A Degenerated Rose Blossom, by John C. Uhrlaub (p. 510). A photograph, with details, of the reversion of the flowers to their original form, viz., leaves.

Corn and Men, by Albert F. Blakeslee, Department of Genetics, Connecticut Agricultural College, Storrs, Connecticut (p. 511-518). A pre-

sentment of the inter-acting influence of heredity and environment. In movements for betterment both factors should be considered.

MONIST, October, 1914. Vol. xxiv., No. 4. *The Probable Origin of Enothera Lamarckiana Ser.* by Hugo de Vries. (Pp. 594-607.) In this article the author investigates the history of *Enothera Lamarckiana* Seringe in order to refute views offered by B. M. Davis in his article, "Was Lamarck's Evening Primrose (*Enothera Lamarckiana* Seringe) a form of *Enothera grandiflora* Solander?" published in the Bulletin of the Tor. Bot. Club, xxxix., 1912, 519-533, and other journals, in which he remarks "that *Lamarckiana* has come down to us greatly modified, that its parentage is far from pure, that it is in fact of hybrid origin." De Vries proves that this assertion is clearly contradicted by the preservation, in excellent condition, of the three specimens of Lamarck, Pounet and Michaux, not known to Davis. He summarises the results of his historical investigation as follows:—

"1. *Enothera Lamarckiana* Ser. is represented by specimens in the herbaria of Lamarck, Pourret and Michaux, and is, so far as this material enables us to judge, at the present time exactly the same plant as it was at that period. It has come down to us, through more than a century, as unaltered and as constant as true species usually do."

"2. It has been a component of the flora of the Eastern United States, where Michaux collected it and whence Lamarck derived his specimen.

"3. At the present time it is component of the flora of England, and is as well established in that country as is *O. biennis* in different parts of Europe.

"4. The strain which is now in cultivation, and which was introduced into the trade about the middle of the last century, was probably derived from some wild English locality, which itself may have come from an introduction into Europe of the seeds, collected either by Michaux himself or by some other botanist of his period."

THE TRAINING SCHOOL BULLETIN, October, 1914. Vol. xi., No. 6. An "Editorial" explains that the *Bulletin* has been again enlarged in order to present more adequately information relating to research and general institutional procedure along educational, medical and other lines. For seven years the laboratory at this training school has been making a scientific study of the various phases of mental deficiency. It is known that in 60 to 70 per cent. of the cases feeble-mindedness is inherited, but other causes are being sought for.

The Binet Measuring Scale of Intelligence, by Dr. Henry H. Goddard. Pp. 86-91. This is an elaboration of an article which appeared in March, 1913, the object being to explain the Binet-Simon scale for determining degrees of intelligence, and the care with which it must be applied. The author explains that Binet, whose researches in individual psychology are world-famous, has studied both normal and defective children, and that he tested all his tests over a period of many years before standardising them. The scale has been objected to on the ground that some children are taught things that other children are not; but the author points out that, although some of the questions are a little affected by instruction, Binet has been very successful in avoiding things that are usually taught to children. The author's conclusion is that the scale is both accurate and practicable, but it requires a highly trained expert to apply the test successfully. (See notes on "Child Study," ante.)

One Year's Work, by Mrs J—— J——. Pp. 98-99. This is an account, by an intelligent, persevering woman, of a year's work with a defective girl of nine and a half, of whom she assumed charge. The description of the child was: "Head bent forward so that she faced the floor. Her face was very large without the faintest gleam of intelligence. She was loose-lipped, and dribbled at the mouth. . . . Her tongue lay

flat in her mouth. She made no attempt to use it when she spoke. . . . When I first tried to teach her to say words the only way I could get her to use her tongue was to take it between my finger and thumb and hold it where I wanted it to be." At the end of a year the child could read with expression and write little letters home. This record is a further illustration of the fact that outside appearance, and even personal habits, are no safe criterion of mental faculty.

An Experiment in Profitable Work. Pp. 100-102. This is an account of work accomplished by mentally defective children in a New York school. The class teacher, after careful investigation, decided on brush-making, starting with shoe-brushes. The 16 boys forming the class took to the work enthusiastically. Under supervision five of the lads have developed into expert brush-makers able to earn a living.

SCIENTIA. La moderna evoluzione delle dottrine e delle conoscenze sulla Vita. Parte 1a. I problemi fondamentali bio-fisiologici. C. Golgi (pp. 190-224). In his address, delivered at the Lombardian Institute of Sciences and Letters, on January 8th, the lecturer deals with progress in fundamental bio-physiological problems. Starting with the pronouncement of the famous physiologist, Du Bois-Reymond regarding force and matter ("Ignoramus ignorabimus"), the lecturer passes in review the epoch-making discoveries that have occurred during the four decades which have elapsed since they were uttered at Leipzig. He reviews the light which recent years have thrown on our knowledge of human physiology and, he hopes, on psychic phenomena. With reference to the knowledge acquired on cell-organisation and its failure to reveal the mystery of life, he suggests that this principle should now be sought in other parts, more truly simple.

Future conquests in biology will, in his opinion, lie in the field of physical chemistry. The fact that Cesario-Demel has obtained evidences of revivification in hearts taken from corpses 43 hours after death, when they presented evident signs of putrefaction points to changes that are not only morphological and structural but also to physico-chemical conditions.

Les lois de l'évolution de l'art. R. Maunier (pp. 260-273). In this critique of M. Deonna's "L'Archéologie, sa valeur, ses méthodes" (3 vols., Paris, 1912), the reviewer expresses the opinion that the theory of aesthetic evolution propounded by M. Deonna is likely to prove of interest both on account of the method of investigation followed by the author and the conclusions he has evolved. M. Deonna maintains the principle of the regularity of aesthetic phenomena; art changes as its milieu changes. He seeks for the laws which govern these changes. F. T.

RIVISTA DI ANTHROPOLOGIA Vol. xviii, Fasc. III, 1913, published at Rome. *La Misura Della Vita*, by Professor Alfredo Nicetolo, is an interesting study of the question of the variations in the weight of infants at birth, especially as influenced by the fact of the infant being a first or a later child. The subject is one which has engaged the attention of many scientific writers. Of these we may mention Dr. Corrado Gini, who presented a mass of data on the subject in the course of an important paper for the First International Eugenics Congress. Professor Nicetolo adopts a slightly different standpoint, and the main conclusions at which he arrives are summarised by himself as follows —

(a) There is certainly a difference in weight between first-born children and those born later. The latter are, on the average, heavier.

(b) The later-born show a slightly greater range of variability than first-born children, and this increased range is still shown even when exceptional cases (*i.e.* pathological cases) are eliminated from the statistical curves.

(c) As compared with first-born children a greater number of the later-born are found at one or other extreme end of the scale, and especially at the heaviest end.

(d) It seems that male and female infants differ from one another in weight more if they belong to the ranks of the later-born than if they are first-born children.

(e) Taking the average weight and the variability of infants as affected by the age of the mother, and limiting ourselves to cases of first-born children whose mothers are engaged in similar occupations, we find that (1) the offspring of mothers of more than 25 years of age are heavier than those whose mothers are under 19, and that (2) the range of variation in weight seems greatest among the offspring of mothers whose ages are less than 19 and over 25. It is greater, however, where the mother is advanced in years than where she is very young, and lowest where the mother is of medium age (20 to 24).

(f) Some of the smallest weights are found among the first-born of very young mothers, while amongst those of mothers of advanced age are instances of really heavy children.

(g) Even when we make selected groups of mothers alike from the point of view of the amount of rest enjoyed by them during gestation, one finds a greater variability as regards weight in the later-born than in the first-born.

(h) But it is observed that the difference between such variabilities lessens when one passes from the groups of mothers who have not rested to those who have had a considerable period of repose, because the latter groups have lost some of the lowest weights belonging to first-born children. At the same time, so far as regards children of very heavy weight, the difference remains in favour of the later-born.

(i) It cannot be said to be probable (still less can we assert it as a fact) that any difference exists between the offspring of mothers who have rested for two or three months during gestation and those who have rested for a longer period. On the other hand, we can affirm that there are unquestionably differences (always as regards weight) between the children of mothers who worked all the time in unhygienic conditions (in factories) and those of mothers who rested for some definite period.

H. R.

RIVISTA ITALIANA DI SOCIOLOGIA, Marzo-Aprile, 1914. *La distribuzione dei professori delle Università Italiane secondo l'ordine di nascita*, by C. Gini. Professor Gini comments briefly on the discussion which has raged over the alleged pathological weighing of the earlier born members of families, and suggests that, assuming the results not to depend upon faulty methods of computation, they may not be so much a consequence of inherent inferiority as of greater variability in earlier born children perhaps leading to an undue incidence of both good and bad characters. A circular addressed to professors in Italian universities produced replies from 445; of these 416 belonged to families of two or more children, and Professor Gini finds among these a considerable excess of earlier born members who obtained university chairs (it is not clear whether the calculated number is determined by the method advocated by Pearson or by that used by Goring and recommended by Cobb and others). Prof. Gini refers to the objection that a family desire to place the eldest-born in a creditable situation may be a source of bias, and advocates an extension of the inquiry to other characters

M. G.

ARCHIV FÜR RASSEN- UND GESELLSCHAFTS-BIOLOGIE, Vol. x.; 1913; No. 6 (issued June 5th, 1914).

Soren Hansen (Copenhagen): *Über die Minderwertigkeit der erstgeborenen Kinder* (pp. 701-722). In consequence of the rapid fall in the birth-rate in most civilised countries, considerable attention has been given of late by biologists to the question of the relative inferiority of the first-born. Although the results of a number of statistical investigations have been published, among the earliest of which was Professor Pearson's

"First Study of the Statistics of Pulmonary Tuberculosis" (1907), none are very convincing. The tendency, however, of such investigations as have already been carried out, is to show that there is indeed a certain relative preponderance of morbidity, not only among the first-born, but the first two or three children born, and this is corroborated by the material used by Hansen in regard to feeble-mindedness and tuberculosis. Hansen considers it possible, in view of the fact of the earlier-born weighing less at birth than the later-born (up to the fifth or sixth birth, when the weight again tends to decrease), that the circulatory system of the uterus and its surroundings does not reach its full development during the first or even the second pregnancy, and suggests that some of the observed phenomena of inferiority may be explained as a result of innutrition and consequent arrest of development of the foetus. However, as Hansen says, the entire question is still far from having been adequately investigated.

J. Kaup (Munich). *Was Kosten die minderwertigen Elemente dem Staat und der Gesellschaft?* (pp. 723-748). In 1911, the *Umschau*, a German scientific weekly, offered a prize for the best answer to the question as to how much the degenerate cost the nation every year. The jury decided that none of the competitors had succeeded in giving a satisfactory answer, but awarded the prize to Ludwig Jens, a Poor Law official in Hamburg, on account of the excellence of the method which he employed in his investigation. Professor Kaup's paper is, in part, a criticism of Jens', in part a presentation of the results of his own independent research. He, too, found it impossible to answer the question with any degree of accuracy, if for no other reason than because we do not know the relative proportion of hereditary to acquired defectiveness in any population. Dr. Kaup believes that parents should be compelled to pay for the support of their defective children in public institutions to a greater extent than is now the case, and that in such institutions the policy of permanent segregation should be applied in all cases where the expectation of a high percentage of degenerate offspring is warranted. Defectives who are of age should be put under the control of guardians.

Fritz Lens (Munich). I, *Rasseentzerrung in der hellenischen Philosophie*. II, *Der Platonismus*; III, *Der Stoizismus* (pp. 749-777). Count Gobineau said of Ancient Greece, at the height of its civilisation, that it had exchanged its political vitality for a vast development of artistic and literary capacity. According to Gobineau, all history is race-history, and as history chooses its material according to relative values, and all values must necessarily depend upon an ultimate highest value, the race therefore is the supreme standard of value for all the phenomena of this world. As Gobineau was at the same time a devout Catholic, two wholly antagonistic conceptions of life seem to have existed side by side in his mind. Lens, in his discussion of Plato and the Pythagoreans, shows that they, too, were much in the same case. He devotes considerable space to an exposition of Plato's doctrines in "The Republic" and nine pages to the Stoics.

The *Kleinere Mitteilungen* include a further contribution to the controversy over Professor Boas' work on the Changes in the Bodily Form of Immigrants to the United States, by F. Schiff, and a discussion of the question of Asiatic origin of the so-called Alpine Race, by Karl Felix Wolf.

ARCHIV FÜR RASSEN- UND GESELLSCHAFTS-BIOLOGIE, Vol. xi; 1914,
No. 1 (issued July 17th, 1914).

J. Paulsen (Kiel). *Die Herrschaft der Schwachen und der Schutz der Starken in Deutschland. Kritische Betrachtungen eines Arztes über soziale Fürsorge* (pp. 1-20). A criticism of the State Insurance Laws for sickness and accident in Germany. The author discusses in turn their effects upon the insured individual, the medical profession and science of

medicine, hospitals, nurses, etc., and is clearly disposed to pessimism. His suggestions for improvements are based on his own experience as a *Kassenarzt*.

Géza von Hoffmann (Berlin) : *Die rassenhygienischen Gesetze des Jahres 1913 in den Vereinigten Staaten von Nordamerika* (pp. 21-32). A paper supplementing the author's book, *Die Rassenhygiene in den Vereinigten Staaten von Nordamerika*, including a resumé of recent legislation in regard to medical certificates before marriage, the prevention of marriages by the unfit and sterilisation in various of the States of America, and a translation of a decision of the Supreme Court of New Jersey given in a test case tried in 1913, forbidding the sterilisation of a woman patient in an institution for epileptics. The original report of the case was printed in the "Journal of the American Institute of Criminal Law and Criminology," January, 1914.

Leopold von Wiese (Düsseldorf) : *Die Rodias auf Ceylon* (pp. 33-45). An interesting and well-written account of a small outcaste tribe in Ceylon, based in part on the earlier work of Knox (1689), P. Arunachalam in the Ceylon Census Report for 1901 and Papers III., 1905, relating to the Education of the Rodiyas in Ceylon, and E. B. Denham's review of the Ceylon census of 1911, in part on the author's own observation.

Wilhelm Weinberg : *Die Abnahme der Knabenziffer bei in männlicher Linie aussterbenden und erhaltenen Geschlechtern* (pp. 46-95). An elaborate mathematical study of the phenomenon, to which attention was first called by Fahlbeck, that in families which have become extinct in the male line, the relative proportion of male to female births decreases from generation to generation until it finally reaches zero. The same thing is to be observed, although in a less intense degree, in certain male lines which are still in existence. Some writers have interpreted this tendency to be a sign of correlation between degeneracy and sex, but Weinberg shows that it is dependent upon the action of such ordinary factors as determine fertility, the percentage of marriages, etc., and that it would work out in the same way if female instead of male lines carried the family name.

HENRY BERGEN.

QUARTERLY CHRONICLE.

CENTRAL SOCIETY.

October 8th.—At the Grafton Galleries, 5.15 p.m., Mr. Theodore Chambers on "Eugenics and the War." Chairman, Major Leonard Darwin.

December 3rd.—At the Grafton Galleries, 5.15 p.m., Professor J. L. Myres on "Causes of the Rise and Fall in the Population of the Ancient World." Chairman, Major Leonard Darwin.

COMMITTEES.

October 21st.—General Council Meeting.
December 16th.—Executive , , ,

MEETINGS.

October 13th.—Miss Edith Corry before the Chingford Women's Liberal Association on "Eugenics."

November 6th.—Mr. R. Dixon Kingham before the Council of the Federation of Central London Adult Schools on "The Ideal of Eugenics."

November 11th.—Dr. M. Greenwood before the Sesame Club on "The Inheritance of Mental Characters."

December 13th.—Mr. C. S. Stock before the Peel Institute Adult School on "Parenthood in Relation to Heredity."

REPORTS FROM BRANCHES.

As might have been expected, the outbreak of war has had a very serious effect on the general work of the society and its branches. Many of the members of both the central and branch councils have joined the Forces, but those who remain will maintain the organisation in an efficient state, so that it may resume its normal work on the cessation of hostilities. It is also recognised that there are a number of important questions bearing upon eugenics directly connected with the war. Those eugenists who remain in the country would do well to use their time observing conditions and amassing information on these questions.

From Oxford we hear that the general conditions are so changed that no attempt will be made to carry out the normal programme. The secretary of the Brighton Branch is serving with the R.A.M.C., and his duties have been undertaken by another member of the committee.

LIVERPOOL.

No lectures have been arranged until after Christmas. There is nothing to report further except that the branch has circularised the following letter among their own council and some of the professional bodies, including the Architects' Association and the Engineers' Association:—

"October 24th, 1914.

"The Council of this Society has had before it the problem of the effects of the present war upon members of the professional classes. It is probable that they will suffer in several ways; those who minister directly to the public pleasure by means of music, painting and the drama, or who hold precarious positions as governess and tutor, are earliest affected; later, the diminution of capital will curtail contracts in constructive work, architecture and engineering will suffer, while law and accountancy follow. Professional men and their families may thus be brought into straits, and there is also the case of those who have sacrificed a good professional position in order to join the ranks in the Regular or Territorial Forces of the Crown.

"Necessitous cases among officers' families can be dealt with under the Queen's Fund, and those arising in industry and commerce under the Prince of Wales's Fund. It is particularly desirable that war distress in the professional classes should not be overlooked, because their high average of ability and character renders them, as a group, one of the greatest assets of the nation.

"I have been instructed, therefore, by the Council of this Society to approach the secretaries of the leading professional bodies in the Liverpool area upon this point. They may be able to give all necessary assistance to their own members from funds at their own disposal; if not, we might be able to help according to the nature of the case and within the limit of our own funds. It might be well also to bring the general claims of the professional families needing war relief before the committee of the Town Hall Fund; but such representations would carry most weight if made jointly, and if backed up by some clear individual case. I shall be glad to hear from you on these points.

"To make our position quite plain, I would add that we have in mind only those cases of necessity which arise directly out of the war; not others which happen to occur at this time, but are due to more ordinary causes.—Yours very truly,

"R. T. BODEY,
"Hon. Secretary."

NEW SOUTH WALES.

The visit of the British Association to Australia in September was an event of much importance, and had been anticipated with pleasure by the branch of the society. Many members of the Association were also members of this society, and had promised to communicate with the Dominion branch on arrival.

The following reports received from the secretary show that even the war did not quite deaden all interest in eugenics:—

"It affords me much pleasure to report that on 21st ultimo we held a very successful meeting in Sydney. The gathering was arranged in conjunction with the Economics and Commerce Association of this State—an organisation connected with our Sydney University, and of which I am one of the vice-presidents.

Professors Maret and Myres very kindly wrote me from Adelaide on their way to Melbourne. They informed me of the interest in eugenics of one of their party, Dr. F. von Luschan, of Berlin University. I immediately wired the latter at Melbourne, as a result of which he gave an address on our subject at the meeting referred to. Other speakers on the occasion were Professors E. C. K. Gonner, M.A. (president, Section F), Professor of Political Economy in the University of Liverpool; Professor A. W. Kirkaldy, M.A. (recorder, Section F), Professor of Finance in the University of Birmingham; and Professor H. O. Meredith, M.A., Professor of Economics in Queen's University, Belfast. Dr. von Luschan, as you probably know, is Professor of Anthropology in the University of Berlin.

In spite of many counter attractions for the evening (our function, of course, not being on the official list), we had a splendid attendance; Dr. von Luschan spoke for over an hour, and illustrated his remarks with lantern views. His chief claim for eugenics was based on degeneracy, on which he gave many European statistics and diagrams. I am of opinion that his contribution proved a genuine service to eugenic thought in our midst. We had a mixed audience, with a very good proportion of young men, and the medical and professional element. A number of working men were also present. The address referred to, as well as those of the other distinguished gentlemen named (who all dealt with economics), I feel sure did a great deal of good.

I cordially thanked Dr. von Luschan on behalf of our society, and extended him every courtesy within my power.

You will, I am sure, be glad to learn that the Director-General for the Insane in this State (Dr. Eric Sinclair) was present, and at its close was good enough to compliment me on the nature and success of the gathering. He has accepted my invitation to be a vice-president of our society. Dr. C. S. Willis, Principal Medical Officer, Medical Branch of the State Education Department, was also present. He, too, is identifying himself with our work.

I also have to report another interesting event. Dr. C. B. Davenport has been in Sydney, and we have had the pleasure of meeting and hearing him. Unfortunately, I was not made aware of his intended visit by the American eugenic centre, or we should have seen more of him. He seemed very pleased with, and interested in, our work here, and readily consented to speak from our platform. Although time was limited, two functions were arranged—a luncheon in his honour, and a meeting in the evening. Both took place on the 25th inst.

A representative gathering attended the luncheon. Our president, Dr. R. Arthur, M.L.A., who presided, proposed the health of our guest. The toast was supported by the Hon. Sir W. McMillan, K.C.M.G., and Mr. John Sulman (a member of the State Housing Board, and a local authority on modern town-planning), one of our new members. This function enabled me to introduce Dr. Davenport to our principal members, and gave a personal touch to his visit which he seemed to enjoy.

At the Royal Society's house in the evening Dr. Davenport gave an address of over an hour on "Eugenics in its Relation to Social Welfare." The result, I am pleased to be able to report, was a large attendance and a thoroughly successful evening. We had a good proportion of young men and women present, representative of all classes in our midst, from leading professional men and women to the humble ranks of labouring men. Keen interest was taken in the address for such a mixed audience, and at its close an animated discussion took place, showing a spirit of inquiry and attention. We regard the meeting as a fine piece of work for our cause.

The two events made the week a memorable one in the history of the eugenic movement here. They have strengthened the position of the society. Dr. Davenport, having kindly consented thereto, he was unanimously elected as hon. life-member and vice-president of our society."

J. C. ELDRIDGE,
Hon. Secretary.

HASLEMERE BRANCH.

This branch has held one meeting this quarter, on Thursday, November 26th. Mr. W. C. Marshall and the Rev. Canon Selwyn spoke on "Eugenics and War." A discussion followed.

L. E. MUIR,
Hon. Secretary.

